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Report 11190
July 1998

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Integrated Advanced Microwave Sounding Unit-A (AMSU-A)

Performance Verification Report

Subassembly and Complete Instrument Assembly

METSAT AMSU-A2 Antenna Drive Subassembly, P/N 1331200-2, S/N 105

Contract No. NAS 5-32314
CDRL 208

Submitted to:

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Submitted by:

Aerojet
1100 West Hollyvale Street
Azusa, California 91702

Aerojet

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AMSU-A VERIFICATION TEST REPORT

TEST ITEM:	METSAT AMSU- A2 ANTENNA DRIVE SUBSYSTEM PART OF P/N: 1331200-2 SERIAL NUMBER: 105
LEVEL OF ASSEMBLY:	SUBASSEMBLY AND COMPLETE INSTRUMENT ASSEMBLY
TYPE HARDWARE:	FLIGHT
VERIFICATION: PROCEDURE NO.	AE-26002/2C

TEST DATE:

ASSEMBLIES:	START DATE:	12 May 1998
SUBSYSTEM:	START DATE:	17 June 1998

TABLE OF CONTENTS

ITEM

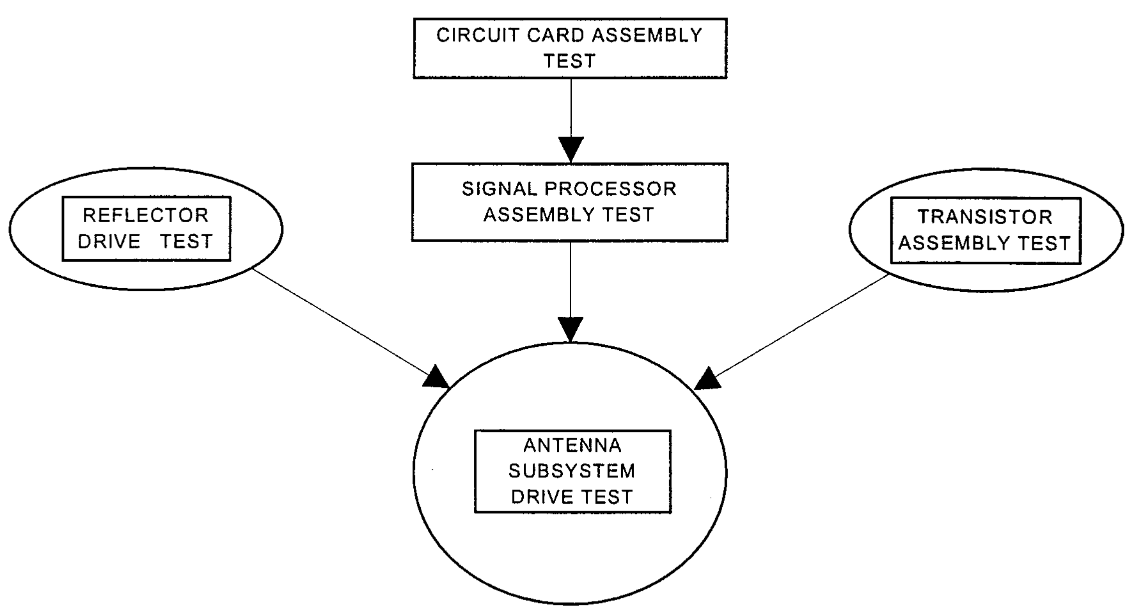
1.0 INTRODUCTION

An antenna drive subsystem test was performed on the METSAT AMSU-A2 S/N 105 instrument. The objective of the test was to demonstrate compliance with applicable paragraphs of AMSU-A specifications S-480-80. Tests were conducted at both the subassembly and instrument level.

2.0 SUMMARY

The antenna drive subsystem of the METSAT AMSU-A2 S/N 105, P/N 1331200-2, completed acceptance testing per AES Test Procedure AE-26002/2C. The test included: Scan Motion and Jitter, Noisy Bus Peak Current and Rise Time, Resolver Reading and Position Error, Gain/ Phase Margin, and Operational Gain Margin.

The drive motor and electronic circuitry were also tested at the component level. The drive motor test includes: Starting Torque Test, Motor Commutation Test, Resolver Operation/ No-Load Speed Test, and Random Vibration. The electronic circuitry was tested at the Circuit Card Assembly (CCA) level of production; each test exercised all circuit functions. The transistor assembly was tested during the W3 cable assembly (1356946-1) test. Refer to Figure 1 for test flow.



Antenna Subsystem and Subsystem Component Test Flow
Figure 1.

The antenna drive subsystem satisfactorily passed all of the performance requirements. There were no failures in any of the antenna drive components during subsystem testing.

The results of the subsystem and component level testing are discussed in more detail in the following sections:

Reflector Drive Assembly...... 5.1
Circuit Card Assemblies 5.2
Signal Processor..................... 5.3
Transistor Assembly 5.4
Antenna Drive Subsystem...... 5.5

3.0 TEST CONFIGURATION

The ***Reflector Drive Assembly Tests*** confirm the operability of the motor under test. The test configuration includes, the motor, motor shaft, bearings, and a supporting housing.

The ***Circuit Card Assembly (CCA) Tests*** confirm the operability of each CCA. Each test includes the CCA under test, electronic test fixtures, and the necessary loads.

A segment of the ***Signal Processor Tests*** ensures the scan drive electronics are functioning properly prior to it's assembly into the instrument. The test configuration includes:

- Timing and Control CCA
- Scan Control Interface CCA
- Relay Driver and Current Monitor CCA
- Interface Converter CCA
- Resolver Data Isolator CCA
- R/D Converter CCA
- Motor Driver CCA
- Test fixture and cabling to simulate the spacecraft bus interface
- Test fixture and cabling to interrogate and analyze positional data
- Test motor and inertia wheel

The ***Transistor Assembly Test*** verifies the correct wiring of the transistor assembly and associated cabling. Test configuration includes the CKT 1000 (continuity and Hi-Pot tester), and test fixtures.

The Antenna Drive Subsystem Tests:

- Are configured with the same motor control CCA's used in the signal processor test, interconnecting wiring, the power transistor assembly, and the drive assembly with reflector.
- The antenna drive subsystem components were all installed in the instrument when the subsystem test was performed.
- DC power for the motor control circuit cards was provided by a DC/DC converter simulator P/N: 1359322-1. The simulator operates on 120VAC facility supplied power. The power for the reflector motor drive circuits however was provided directly by the STE 28V Bus power supply.

4.0 TEST SETUP

The antenna drive subsystem tests are performed during system integration. During system integration testing, the instrument is proven electrically safe via ground isolation, and power distribution checks. Next, the communication link is exercised to ensure commands are received and interpreted correctly. The Antenna Drive Subsystem Test is then performed.

5.0 TEST RESULTS

The Antenna Drive Subsystem components designated for use in the METSAT AMSU-A2 S/N 105 instrument are shown in Table 1. During preliminary testing of these components (in preparation for the antenna drive subsystem test), several component failures occurred. The component failures and system related dispositions are listed below:

- ***Compensator Drive Motor*** - failed motor current limit at -10°C plateau; both CW and CCW. The specification was modified, with customer approval, to accommodate the out of tolerance condition.
- *Transistor Assembly* - failed continuity tests due to incorrect wiring. The assembly was re-wired and passed all subsequent tests

CCA	S/N
Resolver Data Isolator Assembly	F28
Interface Converter Assembly	F23
Scan Motor Driver Assembly	F09
Compensator Driver Assembly	F06
R/D Converter/ Oscillator Assembly	F09

OTHER	S/N
Reflector Drive Motor	F02
Compensator Drive Motor	F06
Signal Processor	F01
Transistor Assembly (W3 cable)	N/A

TABLE 1
METSAT AMSU-A2 S/N 105 Antenna Subsystem Component S/N Designations

All other components designated for use in the METSAT AMSU-A2 instrument (pertaining to the scan drive circuitry) passed on the first time through component testing.

5.1 ANTENNA AND COMPENSATOR DRIVE ASSEMBLY

The tests performed on these units are: Starting Torque Test, Motor Commutation Test, Resolver Operation/ No-Load Speed Test, and Random Vibration. The Motor Commutation and Resolver Operation tests are performed both pre and post-vibration.

Starting Torque
The starting torque test is performed on the rotating segment of the drive assembly to verify the torque associated with bearing friction. Both the reflector drive assembly (F02) and the compensator drive assembly (F06) passed the starting torque test at ambient temperature as well as at the colder plateaus.

Motor Commutation Test
This test is performed to determine the commutation characteristics of the motor under test. The reflector drive assembly (F02) passed the motor commutation test both pre- and post-vibration tests without incident. The compensator drive assembly (F06) failed the current limit requirement at the -10°C plateau. Relief from the specification requirement was requested for and granted by the customer via FRB.

Resolver Operation/ No-Load Speed Test
This test is performed to verify resolver operation as well as speed characteristics and back electromotive force of the motor. Both the reflector drive assembly (F02) and the compensator drive assembly (F06) passed the resolver operation/ no-load speed test both pre- and post-vibration tests without incident.

Random Vibration
Vibration testing was successfully completed; both motors passed the vibration requirements without incident. Both the reflector drive assembly (F02) and the compensator drive assembly (F06) passed the pre- and post-vibration electronic tests as well as the post-vibration visual inspection without incident.

5.2 CIRCUIT CARD ASSEMBLIES

Test procedures were prepared for each motor control circuit card; document revision status is controlled by reference in the shop order. The cards were individually tested to the procedures and results were recorded on data sheets found in Appendix A. The following list indexes the CCA Test Data Sheets:

- *Appendix A1 .... Resolver Data Isolator Assembly*
- *Appendix A2 .... Interface Converter Assembly*
- *Appendix A3 .... Motor Driver Assembly*
- *Appendix A4 .... R/D Converter/ Oscillator Assembly*

All circuit card assemblies passed testing the first time through. The assembly build shop orders contain the part number and accept tag record the of test and select resistors.

5.3 SIGNAL PROCESSOR

For the first time, the entire antenna drive motor electronics is mated together. The test instrumentation commands and interrogates the electronics during this segment of testing. The instrumentation sends position commands to the Interface Converter CCA. The Interface Converter D/A's the command and provides inputs to the Motor Driver CCA. The test motor (instrumentation) responds to the drive signal and feeds back positional data via resolver outputs. The instrumentation then interrogates the Resolver Data Isolator CCA for position data. A comparison is made in the instrumentation between the position command sent and the actual position received. The pass/ fail indication is presented to the operator for test data sheet recording.

The signal processor assembly (F01) passed all scan drive tests.

5.4 TRANSISTOR ASSEMBLY

All transistor assemblies are tested along with their respective W3 cable. The cable is continuity, then hi-pot tested prior to attaching the transistor circuitry. Each transistor pair is exercised validating the turn on voltage, current drawn, and cable wiring as well.

During continuity testing, prior to applying power to the transistor assembly, it was noted that the transistors were wired improperly. The assembly was rewired in accordance with the corrected planning. Tests results were positive; all components operated as designed.

5.5 ANTENNA SUBSYSTEM DRIVE TESTS

The antenna drive motor electronics mates with the instrument microprocessor for the first time during this segment of testing. The microprocessor sends position commands from the memory CCA to the Interface Converter CCA. The Interface Converter D/A's the command and provides inputs to the Motor Driver CCA. The Reflector Drive Motor responds to the drive signals and feeds back positional data via the resolver outputs. The microprocessor then interrogates the Resolver Data Isolator CCA for position data.. The microprocessor in turn communicates with the spacecraft interface.

During other segments of the test, positional data is monitored via a potentiometer attached to the shaft of the reflector drive assembly. This provides scan characteristic information in regard to overshoot, jitter, and beam position transition timing.

The remaining paragraphs in this section discuss tests that ensures the instrument complies with specific operating parameters. Prior to conducting these tests there is a series of preliminary checks that are run to select component values that customize the operating parameters of the instrument. These checks perform the following functions:

- Program "on board" memory with Beam Position Pointing Angles
- Adjust for peak Motor Current Limits
- Observe Preliminary Scan Dynamics
- Identify Mechanical Resonant Frequencies

Beam Position Pointing Angles are calculated from Nadir pointing direction which is determined on the antenna range. The instrument's EPROMs (EPROMs for testing; PROMs for final configuration) are programmed to reflect the position commands. The initial programming may require fine tuning; fine tuning is determined during the remaining segments of the test procedure.

Motor Current Limits were adjusted, via selecting "test and select" resistors, to comply with the specification requirement; less than 2 amp peak current.

Preliminary Scan Dynamics looked good; transition times, overshoot and jitter were all acceptable at the sampled pointing directions (5).

The ***Mechanical Resonant Frequencies*** were identified; notch filters were calculated and installed to compensate for these resonant frequencies.

5.5.1 SCAN MOTION AND JITTER

In this test, the antenna position was measured in a series of five 8-sec full scans. The measurement was made with a 1-turn test potentiometer temporarily affixed to the rear end of the motor shaft. A Dynamic Signal Analyzer (DSA) was connected to the pot wiper to record the antenna position data. Five scans were captured and stored on the AMSU-A2 Test Data File disc. One representative waveform is presented in Appendix B1.

Each 3.33 degrees scene step was expanded and checked for a 42 msec max step time, and the 158 msec integration period. Expanded waveforms were plotted and are presented in Appendix B2 thru B30. All of the scene steps meet the step response requirement for transition time, overshoot, and jitter.

Slew periods to the cold and warm calibration stations were measured and met requirements. A time of 0.21 sec is allocated for the 35.0 degree slew to cold cal, and 0.40 sec for the 96.67 degree slew to warm cal. Calibration station jitter was less than the $\pm$ 5 % maximum permitted. Expanded waveforms were plotted and are presented in Appendix B31 thru B34. The waveforms are also stored on the AMSU-A2 Test Data File disc. The test data sheet is presented in Appendix B35

5.5.2 NOISY BUS PEAK CURRENT AND RISE TIME

The noisy pulse load bus peak current and the rate of change of current were measured. The peak current must be less than 2A at any beam position along the scan. Peak current along the scan is 1.88A. The current rate of change while transitioning from one beam position to the next (including the transition to the cold calibration and warm calibration targets) should be greater than 70 microseconds. A random 3.33° step was selected; the transition to the next step was 1.1 ms. The transition to the warm cal position start and stop was significantly longer than the required 70 ms; 1.6 and 56 ms respectively.

The peak bus current was measured across the entire scan and met the requirement. The full scan waveform was plotted and is presented in Appendix C1. The waveform is also stored on the AMSU-A2 Test Data File disc. The test data sheet is presented in Appendix C2

5.5.3 RESOLVER READING AND POSITION ERROR

The 14-bit command position word is stored in the "on-board" memory and is read to the motor drive circuitry under microprocessor program control. The microprocessor also

reads the resolver output at each of the thirty scene stations, and at the cold and warm calibration positions. The readings are made at the start of integration (LOOK 1), and halfway into the integration period (LOOK 2). The resolver data is sent to the spacecraft interface for subsequent transmission to the STE.

The purpose of this portion of the test is to demonstrate that the antenna is meeting beam pointing requirements.

If the antenna is out of the pointing tolerance of > ± 10 counts at LOOK 1 or > ± 5 counts at LOOK 2 , the EPROM is reprogrammed to bring the pointing direction to within the prescribe tolerances. A copy of the STE computer print out showing the pointing direction is shown in Figure 2.

		Actual		Difference*	
BP	Command	Look 1	Look2	Look 1	Look2
1	6657	6655	6655	2	2
2	6505	6507	6503	-2	2
3	6353	6355	6350	-2	3
4	6202	6204	6199	-2	3
5	6050	6052	6049	-2	1
6	5898	5900	5897	-2	1
7	5747	5748	5746	-1	1
8	5595	5597	5593	-2	2
9	5443	5444	5440	-1	3
10	5292	5293	5288	-1	4
11	5140	5141	5138	-1	2
12	4988	4990	4987	-2	1
13	4837	4839	4834	-2	3
14	4685	4687	4684	-2	1
15	4533	4536	4532	-3	1
16	4382	4384	4381	-2	1

		Actual		Difference*	
BP	Command	Look 1	Look2	Look 1	Look2
17	4230	4232	4227	-2	3
18	4078	4080	4076	-2	2
19	3927	3928	3923	-1	4
20	3775	3777	3774	-2	1
21	3623	3627	3621	-4	2
22	3472	3475	3470	-3	2
23	3320	3323	3319	-3	1
24	3168	3171	3167	-3	1
25	3017	3020	3015	-3	2
26	2865	2868	2862	-3	3
27	2713	2716	2710	-3	3
28	2562	2564	2558	-2	4
29	2410	2412	2408	-2	2
30	2258	2260	2255	-2	3
CC 1	665	665	666	0	-1
WC	12650	12650	12651	0	-1

Figure 2. Beam Position Pointing Directions and Error Calculation

5.5.4 GAIN/PHASE MARGIN

A gain/phase margin test was performed on the antenna drive subsystem. The test was performed by obtaining a Bode plot of the control loop and measuring the gain at 180° phase differential and the phase margin at the 0db crossover point.

The Dynamic Signal Analyzer (DSA) was used to make the measurement operating in the swept sine mode. Three separate Bode plots were made on the antenna and the gain and phase margins were determined from each plot. The gain margin measured was 13.5 db (average of three) and the phase margin measured was 60.7 degrees (average of three). These margins exceed the specification requirements of 12 db and 25 degrees and therefore are acceptable. The three Bode waveforms were plotted and are presented in Appendix D1 thru D3. The waveforms are also stored on the AMSU-A2 Test Data File disc. The test data sheet is presented in Appendix D4.

5.5.5 OPERATIONAL GAIN MARGIN

An operational gain margin test was performed on the instrument three times. This test consists of increasing the gain of the control loop until oscillation occurs. The gain increase and frequency of oscillation are measured. An increase in gain greater than 9 db is required; the frequency of oscillation is an observation.

A 50K pot was connected in series with the R58 feedback resistor on amplifier AR8. The resistance of the test pot was slowly added to the feedback resistor while observing the reflector for oscillations.

The reflector begins to produce an audible sound as gain is increased. The following added resistance values are calculated to have the following gain margins:

Resistance	Gain
38.58	9.3 db
41.20	9.7 db
42.88	9.9 db

The first mode mechanical resonance of the shaft and reflector is about 228 Hz as shown in the power spectrum. The power spectrum waveform was plotted and is presented in Appendix E1. The waveform is also stored on the AMSU-A2 Test Data File disc. The test data sheet is presented in Appendix E2.

6.0 CONCLUSION

Based on the test results, it can be concluded that the METSAT AMSU-A2 S/N 105 antenna drive subsystem meets the AMSU-A specification requirements.

7.0 TEST DATA

Test data for the AMSU-A2 S/N 105 obtained in the antenna drive subsystem test is attached. Data sheet number and type of test is shown in the following Appendix Index.

APPENDIX INDEX

TEST DATA SHEET B-6 (Sheet 1 of 2)

RESOLVER DATA ISOLATOR CCA (P/N 1334972) (Paragraph 6.6.7)

Date: 4/14/97
S/N: F-28
1334972-1

6.6.7.1 Supply Voltages

Supply*	Measured Value (V)	Limits (Vdc)	Pass/Fail
+5 V (I)	5.00	± 0.25	P
+5 V (U)	5.01	± 0.25	P

6.6.7.2 Supply Currents

Steps 1 and 2:

Supply*	Measured Value (mA)	Limits (mA)	Pass/Fail
+5 V (I)	53.27	100 max	P
+5 V (U)	320.41	400 max	P

Steps 3 and 4:

Supply*	Measured Value (mA)	Limits (mA)	Pass/Fail
+5 V (I)	83.24	150 max	P
+5 V (U)	11.06	30 max	P

* I = Isolated, U = Unisolated

6.6.7.3 Resolver Data

Bit No.	Pass/Fail
API 0 - AP Bit 0	P
API 1 - AP Bit 1	P
API 2 - AP Bit 2	P
API 3 - AP Bit 3	P
API 4 - AP Bit 4	P
API 5 - AP Bit 5	P
API 6 - AP Bit 6	P
API 7 - AP Bit 7	P
API 8 - AP Bit 8	P
API 9 - AP Bit 9	P
API 10 - AP Bit 10	P
API 11 - AP Bit 11	P
API 12 - AP Bit 12	P
API 13 - AP Bit 13	P

6.6.7.4 Converter Busy Pulse

Converter Busy Pulse	Measured Value (μsec)	Limits (μsec)	Pass/Fail
15.0	14.9	± 3.0	P

TEST DATA SHEET B-6 (Sheet 2 of 2)

RESOLVER DATA ISOLATOR CCA (P/N 1334972) (Paragraph 6.6.7)

Comments:
NONG

Conducted by: Denise Lee 4/14/97
Test Engineer Date

Verified by: Judie Hervey (QA 269) 4-14-97
Quality Control Inspector Date

Approved by: [signature] 4/16/97
DCMC Date

F2

TEST DATA SHEET B-13 (Sheet 1 of 3)

INTERFACE/CONVERTER CCA (P/N 1331697) (Paragraph 6.13.7)

Date: 5/7/97
CCA S/N: F23
1331697-1

6.13.7.1 Supply Voltages

Supply	Measured Value (Vdc)	Limits (Vdc)	Pass/Fail
+5V (U)	+5.01V	+5V± 0.05	P
+15V (I)	+15.03V	+15V± 0.15	P
-15V (I)	-15.01V	-15V± 0.15	P
+5V (I)	+5.00V	+5V± 0.05	P

6.13.7.2 Supply Currents

Step 1 (CP and API Low):

Supply	Measured Value (mA)	Limits (mA)	Pass/Fail
+5V (U)	85.96mA	70 - 110	P
+5V (I)	3.42mA	1.5 - 5.5	P
+15V (I)	18.05mA	15 - 23	P
-15V (I)	20.84mA	18 - 26	P

Step 2 (CP and API High):

Supply	Measured Value (mA)	Limits (mA)	Pass/Fail
+5V (U)	56.24mA	40 - 70	P
+5V (I)	23.84mA	18 - 30	P
+15V (I)	18.05mA	15 - 23	P
-15V (I)	20.84mA	18 - 26	P

6.13.7.3 Amplifier Offsets

Amplifier	Measured Value (mV)	Limits (mV)	Pass/Fail
AR1	-0.01mV	0.0 ±0.15	P
AR2	-0.26mV	0.0 ±2.0	P

TEST DATA SHEET B-13 (Sheet 2 of 3)

INTERFACE/CONVERTER CCA (P/N 1331697) (Paragraph 6.13.7)

6.13.7.4 Subtraction and D-A Conversion

Step 1:

Actual Position (API) MSB LSB	Command Position (CP) MSB LSB	AR1 Output* Voltage Required (Vdc)	Test Result (Vdc)	Pass/Fail
00000000000000	00000000000000	0.00000	-0.00001	P
00000000000001	00000000000000	-0.00061	-0.00067	P
00000000000010	00000000000000	-0.00122	-0.00134	P
00000000000011	00000000000000	-0.00184	-0.00197	P
00000000000100	00000000000000	-0.00245	-0.00261	P
00000000001000	00000000000000	-0.00490	-0.00515	P
00000000010000	00000000000000	-0.00979	-0.01025	P
00000000100000	00000000000000	-0.01958	-0.02044	P
00000001000000	00000000000000	-0.03917	-0.04083	P
00000010000000	00000000000000	-0.07834	-0.08162	P
00000100000000	00000000000000	-0.15667	-0.16320	P
00001000000000	00000000000000	-0.31334	-0.32639	P
00010000000000	00000000000000	-0.62669	-0.65285	P
00100000000000	00000000000000	-1.25338	-1.3059	P
01000000000000	00000000000000	-2.50675	-2.6117	P
10000000000000	**00000000000000**	**-5.01350**	-5.2235	P

* Tolerance on output voltage is ± 10%

Step 2:

Actual Position (API) MSB LSB	Command Position (CP) MSB LSB	AR1 Output* Voltage Required (Vdc)	Test Result (Vdc)	Pass/Fail
00000000000000	00000000000000	0.00000	-0.00002	P
00000000000000	00000000000001	0.00061	+0.00055	P
00000000000000	00000000000010	0.00122	+0.00117	P
00000000000000	00000000000011	0.00184	+0.00174	P
00000000000000	00000000000100	0.00245	+0.00245	P
00000000000000	00000000001000	0.00490	+0.00501	P
00000000000000	00000000010000	0.00979	+0.01014	P
00000000000000	00000000100000	0.01958	+0.020345	P
00000000000000	00000001000000	0.03917	+0.04074	P
00000000000000	00000010000000	0.07834	+0.08154	P
00000000000000	00000100000000	0.15667	+0.16321	P
00000000000000	00001000000000	0.31334	+0.32645	P
00000000000000	00010000000000	0.62669	+0.65306	P
00000000000000	00100000000000	1.25338	+1.3057	P
00000000000000	01000000000000	2.50675	+2.6114	P
00000000000000	**10000000000000**	**-5.01350**	-5.2235	P

* Tolerance on output voltage is ± 10%

F

TEST DATA SHEET B-13 (Sheet 3 of 3)

INTERFACE/CONVERTER CCA (P/N 1331697) (Paragraph 6.13.7)

6.13.7.5 Strobe Function

Step 1: Strobe Low

	Pass/Fail
No E11 Change with Input CP Changes	P

Step 2: Strobe High

	Pass/Fail
E11 Change with Input CP Changes	P

6.13.7.6 Amplifier Gain

	Measured Value (Vdc)	Limits (Vdc)	Pass/Fail
E11	0.32645	-	P
E10	3.5913	-	P
E10 Voltage / E11 Voltage	11.0	10.7 - 11.3	P

6.13.7.7 Ground Isolation

	Measured Value (MΩ)	Limits (MΩ)	Pass/Fail
Pin 91 to Pin 7 DC Resistance	200MΩ	>20	P

Comments: NONE

Conducted by:	[signature] Test Engineer	5/7/97 Date
Verified by:	[signature] QA 269 Quality Control Inspector	5/8/97 Date
Approved by:	[signature] DCMC	5/12/97 Date

TEST DATA SHEET B-4 (Sheet 1 of 2)

MOTOR DRIVER 3-HALL SENSOR CCA (P/N 1331694) (Paragraph 6.4.3)

S/N: FØ6
Date: 4/21/97
1331694-4

6.4.3.2 Input Signal Offset

Step No.	Test Results	Limits
4	1.78 mV	0.0 ±1 mVdc
6	1.40 mV	0.0 ±1 mVdc
8	1.60 mV	0.0 ±1 mVdc

Step No.	Test Resistor	Resistance Measured
13	E7-E8 (R25)	3.4k
	E9-E10 (R52)	6.76K
	E11-E12 (R33)	3.16K
	E13-E14 (R53)	5.20k
	E15-E16 (R42)	3.16K
	E17-E18 (R54)	3.61k

Step No.	Resistors	Selected Trim Resistors
14	R25	RNC55J3401FS
	R52	RNC55J6311FS
	R33	RNC55J3161FS
	R53	RNC55J5231FS
	R42	RNC55J3161FS
	R54	RNC55J5621FS

Step No.	E Point	Test Results	Limits	Pass/Fail
19	E19	−0.07 mV	0.0 ±1 mVdc	P
	E20	−0.11 mV	0.0 ±1 mVdc	P
	E21	−0.12 mV	0.0 ±1 mVdc	P

6.4.3.3 Motor Driver Operation

Clockwise Rotation:

Step No.	Test Results	Limits	Pass/Fail
2	4.99V	+5V±0.05Vdc	P
	58.6 mA	70mAdc max	P
	15.07V	+15V±0.15Vdc	P
	1.5 mA	3.0mAdc max	P
	−14.98V	-15V±0.15Vdc	P
	18.8 mA	25mAdc max	P
	28.01V	+28V±0.5Vdc	P
	5.6 mA	8mAdc max	P
3	344 mV	400mVdc max	P
4	44.5 mA	50mAdc max	P
5	47.2 mA	50mAdc max	P

26693A
J Feb 97

TEST DATA SHEET B-4 (Sheet 2 of 2)

MOTOR DRIVER 3-HALL SENSOR CCA (P/N 1331694) (Paragraph 6.4.3)

Counter Clockwise Rotation:

Step No.	Test Results	Limits	Pass/Fail
3	282 mV	400mVdc max	P
4	36.6 mA	50mAdc max	P
5	39.9 mA	50mAdc max	P

6.4.3.4 Current Limit Test

Step No.	Test Results	Limits	Pass/Fail
2	439 mA	350-500mAdc	P

Comments: NONE

Conducted by: Dennis Lum 4/21/97
Test Engineer Date

Verified by: [signature] 7A 269 04/28/97
Quality Control Inspector Date

Approved by: [signature] 4/29/97
DCMC Date

TEST DATA SHEET B-4 (Sheet 1 of 2)

MOTOR DRIVER 3-HALL SENSOR CCA (P/N 1331694) (Paragraph 6.4.3)

S/N: FØ9
Date: 4/21/97
1331694-4

6.4.3.2 Input Signal Offset

Step No.	Test Results	Limits
4	1.53 mV	0.0 ±1 mVdc
6	1.11 mV	0.0 ±1 mVdc
8	1.21 mV	0.0 ±1 mVdc

Step No.	Test Resistor	Resistance Measured
13	E7-E8 (R25)	3.40k
	E9-E10 (R52)	5.97k
	E11-E12 (R33)	3.16k
	E13-E14 (R53)	4.55k
	E15-E16 (R42)	3.40k
	E17-E18 (R54)	5.23k

Step No.	Resistors	Selected Trim Resistors
14	R25	RNC55J34Ø1FS
	R52	RNC55J6041FS
	R33	RNC55J3161FS
	R53	RNC55J4531FS
	R42	RNC55J34Ø1FS
	R54	RNC55J5231FS

Step No.	E Point	Test Results	Limits	Pass/Fail
19	E19	0.02 mV	0.0 ±1 mVdc	P
	E20	0.08 mV	0.0 ±1 mVdc	P
	E21	0.10 mV	0.0 ±1 mVdc	P

6.4.3.3 Motor Driver Operation

Clockwise Rotation:

Step No.	Test Results	Limits	Pass/Fail
2	5.00V	+5V±0.05Vdc	P
	56.9mA	70mAdc max	P
	15.07V	+15V±0.15Vdc	P
	1.5mA	3.0mAdc max	P
	-14.98V	-15V±0.15Vdc	P
	18.6mA	25mAdc max	P
	28.03V	+28V±0.5Vdc	P
	5.6mA D.Lung	8mAdc max	P
3	279mV	400mVdc max	P
4	42.6mA	50mAdc max	P
5	47.9mA	50mAdc max	P

TEST DATA SHEET B-4 (Sheet 2 of 2)

MOTOR DRIVER 3-HALL SENSOR CCA (P/N 1331694) (Paragraph 6.4.3)

Counter Clockwise Rotation:

Step No.	Test Results	Limits	Pass/Fail
3	271 mV	400mVdc max	P
4	36.4 mA	50mAdc max	P
5	39.7 mA	50mAdc max	P

6.4.3.4 Current Limit Test

Step No.	Test Results	Limits	Pass/Fail
2	440 mA	350-500mAdc	P

Comments: NONE

Conducted by: [signature] 4/21/97
Test Engineer Date

Verified by: [signature] 7A 269 04/28/97
Quality Control Inspector Date

Approved by: [signature] 4/29/97
DCMC Date

TEST DATA SHEET B-5 (Sheet 1 of 3)

R-D CONVERTER/OSCILLATOR CCA (P/N 1337739) (Paragraph 6.5.7)

Date 8/26/97
CCA S/N F09
1337739-2

6.5.7.1 UUT Pre-Test

Step 2:

Supply Currents (Without UUT)

Supply (Vdc)	(Baseline) Measured Value (mA) (Without UUT)	Limits (mA)	Pass/Fail
+15	0.06	0-1	P
-15	-0.29	-1 - 0	P
+5	0.06	0-1	P

Supply Voltages (Without UUT)

Supply	Measured Value (V)	Limits (V)	Pass/Fail
+15V (I)	15.02	± 0.50	P
-15V (I)	-15.01	± 0.50	P
+5V (I)	5.03	±0.25	P

Step 6:

Supply Currents (UUT Installed)

Supply (Vdc)	Measured Value (mA) (UUT Installed)	Difference (mA) (Measured - Baseline)	Limits (mA)	Pass/Fail
+15	32.82	32.76	20-40	P
-15	-41.07	-40.78	-30 - -50	P
+5	55.05	54.99	30-70	P

6.5.7.2 Supply Voltages (UUT Installed)

Supply	Measured Value (V)	Limits (V)	Pass/Fail
+15V (I)	15.01	± 0.50	P
-15V (I)	-14.96	± 0.50	P
+5V (I)	5.02	±0.25	P

6.5.7.3 Oscillator Frequency, Duty Cycle, and Output Voltage

Parameter	Measured Value	Limits	Pass/Fail
Frequency	1600Hz	1550-1650 Hz	P
Duty Cycle	51%	45-55 %	P
Output Voltage	8.19V	7.6-8.4 Vrms	P

TEST DATA SHEET B-5 (Sheet 2 of 3)

R-D CONVERTER/OSCILLATOR CCA (P/N 1337739) (Paragraph 6.5.7)

6.5.7.4 R-D Converter Operation

Step 1:

Bit Number/ Test Fixture Label	CW Pass/Fail	CCW Pass/Fail
API 0/1	P	P
API 1/2	P	P
API 2/3	P	P
API 3/4	P	P
API 4/5	P	P
API 5/6	P	P
API 6/7	P	P
API 7/8	P	P
API 8/9	P	P
API 9/10	P	P
API 10/11	P	P
API 11/12	P	P
API 12/13	P	P
API 13/14	P	P
Converter Busy	P	P

Step 2:

RS (E10)	Measured Value (Vdc)	Calculated Value (Vdc) * CCA -1 Assy	Calculated Value (Vdc) * CCA -2 Assy	Pass/Fail
CW Rotation**	1.472	(+) N/A	(+) 1.790	P
CCW Rotation**	-1.685	(-) N/A	(-) 1.790	P

* Signal level function of test and calibration gain resistors. Record calculated value and measured value. Measured value shall be within ±~~10~~ 2 percent of calculated value. The equation is as follows:

QC 228 20 [signature] 8-26-97

$$V = \pm 0.155\left(\frac{R20}{R17}\right) \pm \cancel{10}\,2\%$$

20 QC 228 $= 0.155\left(\frac{59k}{5.11k}\right)$ $= 1.790V$ [signature] 8-26-97

6.5.7.5 Amplifier Gain

PES-RS	Measured Value (Vdc)	Limits (Vdc)	Pass/Fail
PES = +0.300 Vdc	1.162 V	1.00 to1.30	P
PES = -0.300 Vdc	1.086 V	1.00 to 1.30	P

6.5.7.6 Direction Control Signal

DIR CNTRL	Measured Value (Vdc)	Limits (Vdc)	Pass/Fail
CW Rotation	5.00 V	4.5 to 5.5	P
CCW Rotation	0.121 V	0.0 to 0.4	P

TEST DATA SHEET B-5 (Sheet 3 of 3)

R-D CONVERTER/OSCILLATOR CCA (P/N 1337739) (Paragraph 6.5.7)

6.5.7.7 Notch Filter Frequency Response

Frequency	Measured Value (Hz)	Calculated Value (Hz) * CCA -1 Assy	Calculated Value (Hz) * CCA -2 Assy	Pass/Fail
AR3 Notch	N/A	N/A	N/A	N/A
AR4 Notch				
AR5 Notch				

* Notch frequencies shall be within ±3 percent of values determined by test and calibration resistors. Record calculated and measured values.

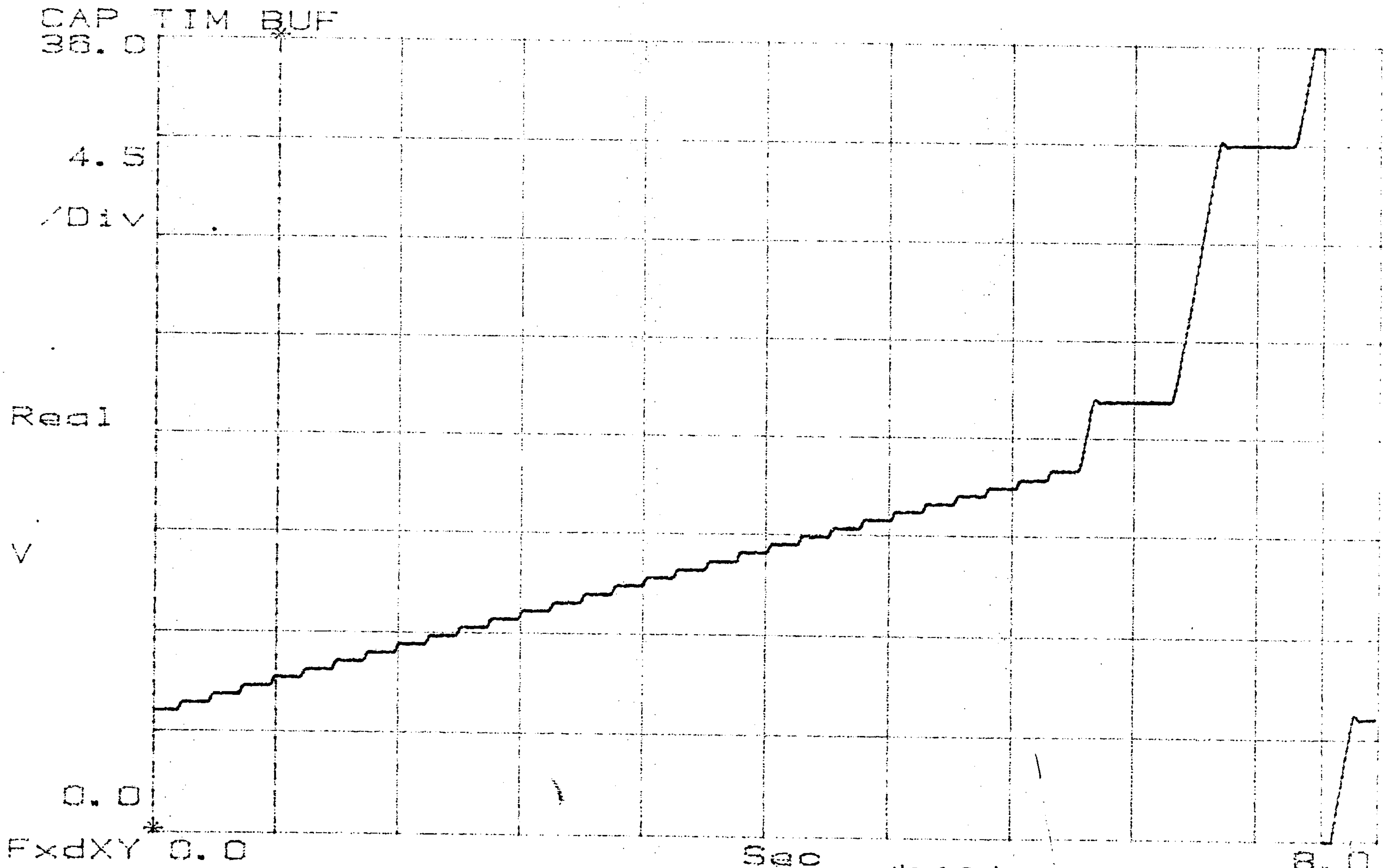
Comments:
NONE

Conducted by: Test Engineer — Date 8/26/97

7A 268

Verified by: Quality Control Inspector — Date NOV 19 '97

Approved by: DCMC — Date 11-19-97

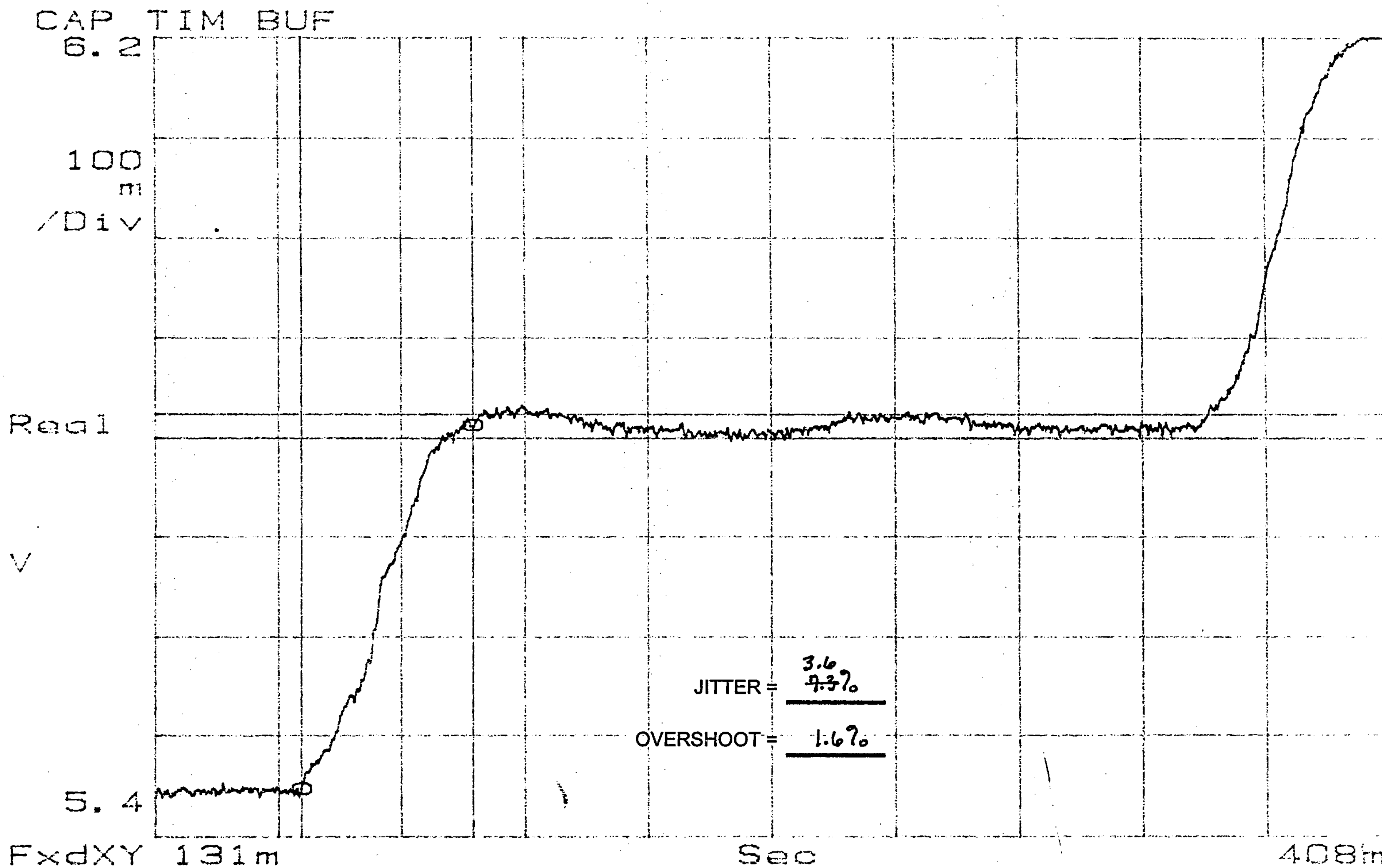


HETSAT AMSU-A2 105
AE26002/2D PARA: 3.4.5.4 step 7f
file: 7AP_FS5 268 MAY 28 98

SCENE 2

FILE NAME: 7AP_FS1

X=202.3mS ΔX=38.67mS Y=5.79806 ΔY=24.24mV
Ya=5.811 ΔYa=364.9mV



JITTER = 3.6 ~~7.3~~ %

OVERSHOOT = 1.6%

AE26002/2D

PARA: 3.4.5.5 Step 9

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S/N 105

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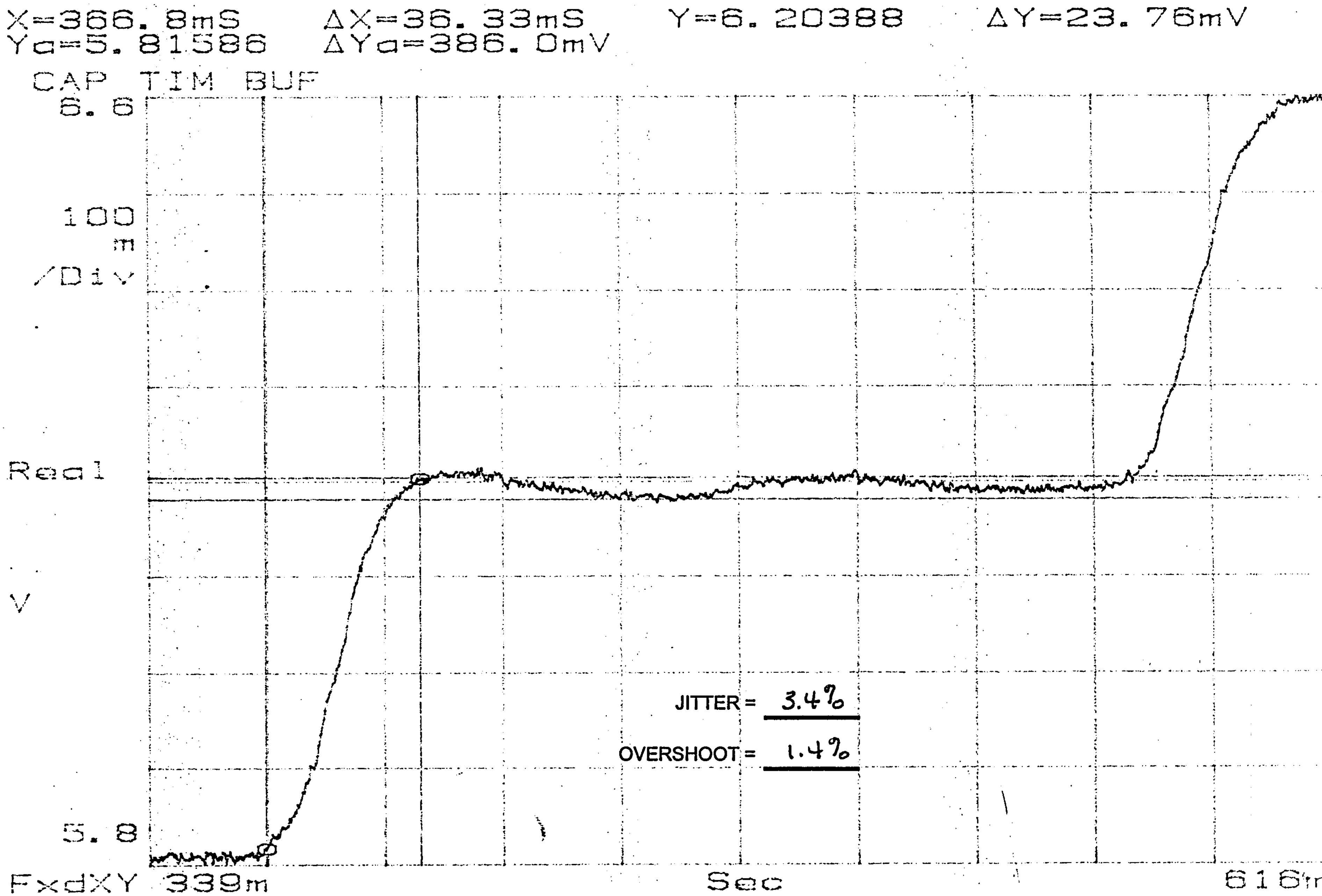
SCEN 3
FILE NAME: 7AP_FS1



JITTER = 3.4%

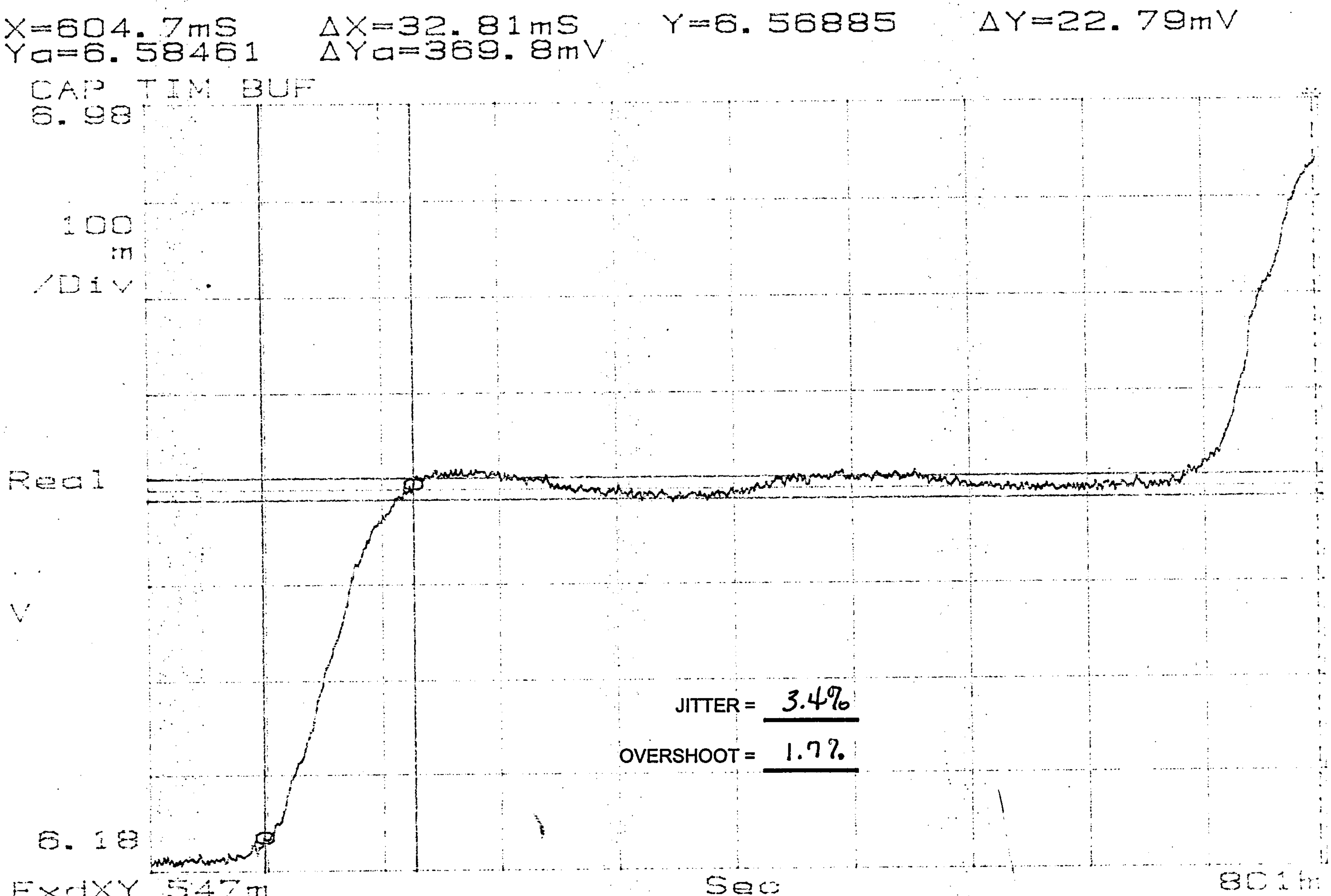
OVERSHOOT = 1.4%

AE26002/2D
PARA: 3.4.5.5 Step 10

AMSU-A2
S/N 105

7A 268 MAY 28 '98

SCEN 4
FILE NAME: 7AP_FS1



JITTER = 3.4%

OVERSHOOT = 1.7%

AE26002/2D
PARA: 3.4.5.5 Step 11

AMSU-A2 S/N 105 7A 268 MAY 28 '98

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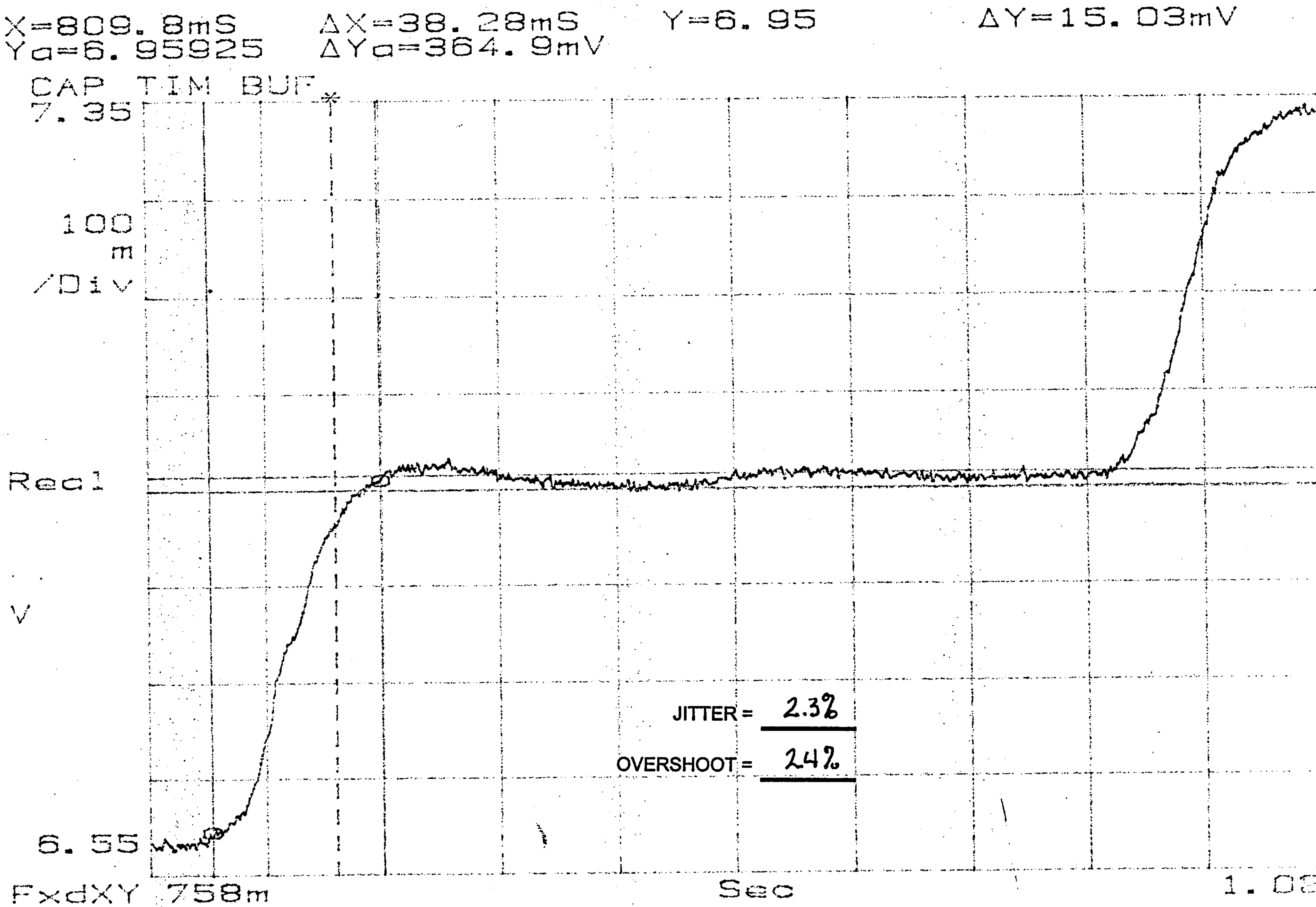
SCEN. 5

FILE NAME: 7AP_FS1



JITTER = 2.3%

OVERSHOOT = 24%

AE26002/2D

PARA: 3.4.5.5 Step 12

AMSU-A2

S/N 105

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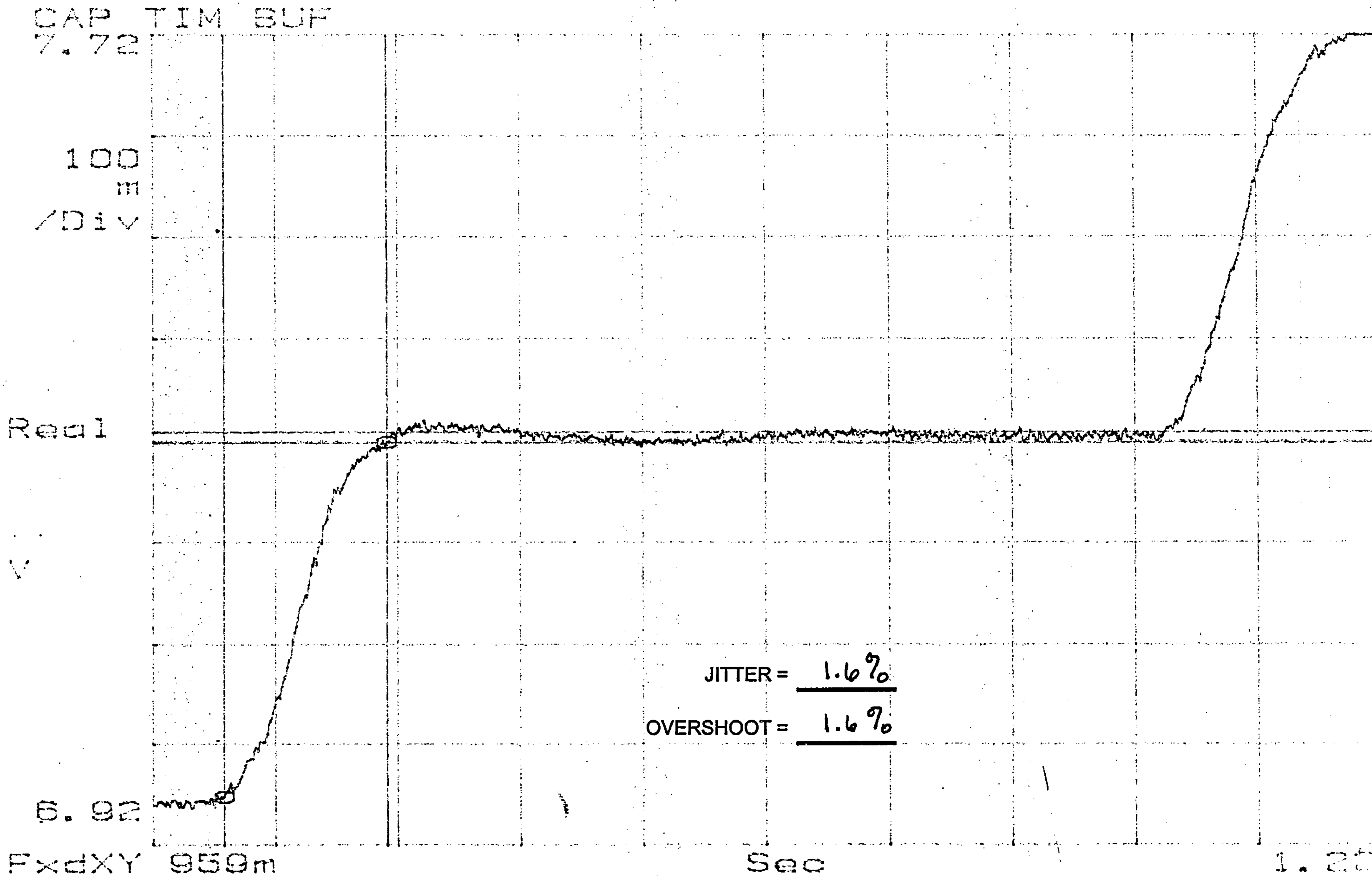
SCEN 6
FILE NAME: 7AP_FS1

X=1.009 S ΔX=35.16mS Y=7.32873 ΔY=10.67mV
Ya=7.31767 ΔYa=350.3mV



JITTER = 1.6%

OVERSHOOT = 1.6%

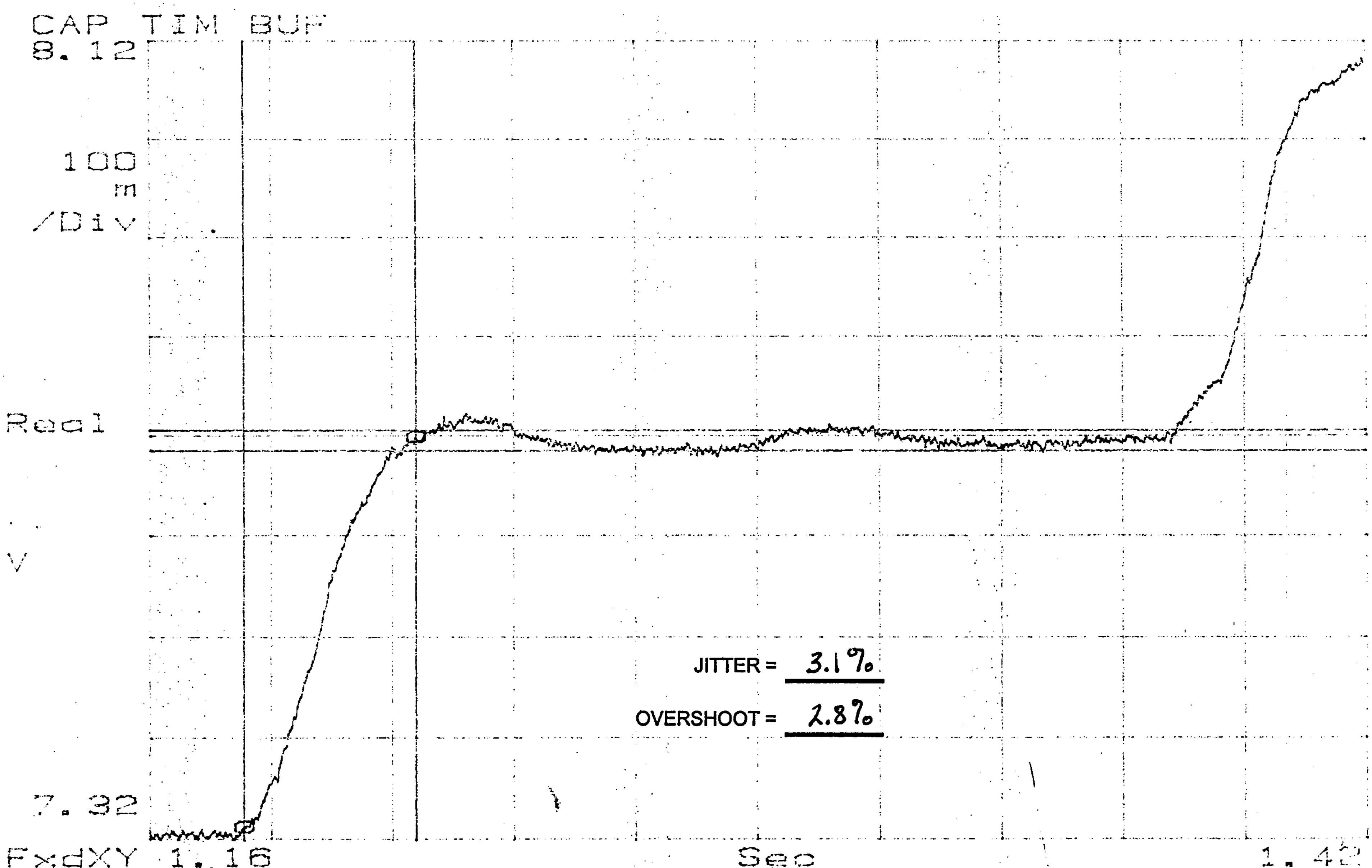
AE26002/2D
PARA: 3.4.5.5 Step 13

AMSU-A2
S/N 105

7A 268 MAY 28 '98

SCEN 1
FILE NAME: 7AP_FS1

X=1.214 S ΔX=37.5mS Y=7.72582 ΔY=20.85mV
Ya=7.71826 ΔYa=386.0mV



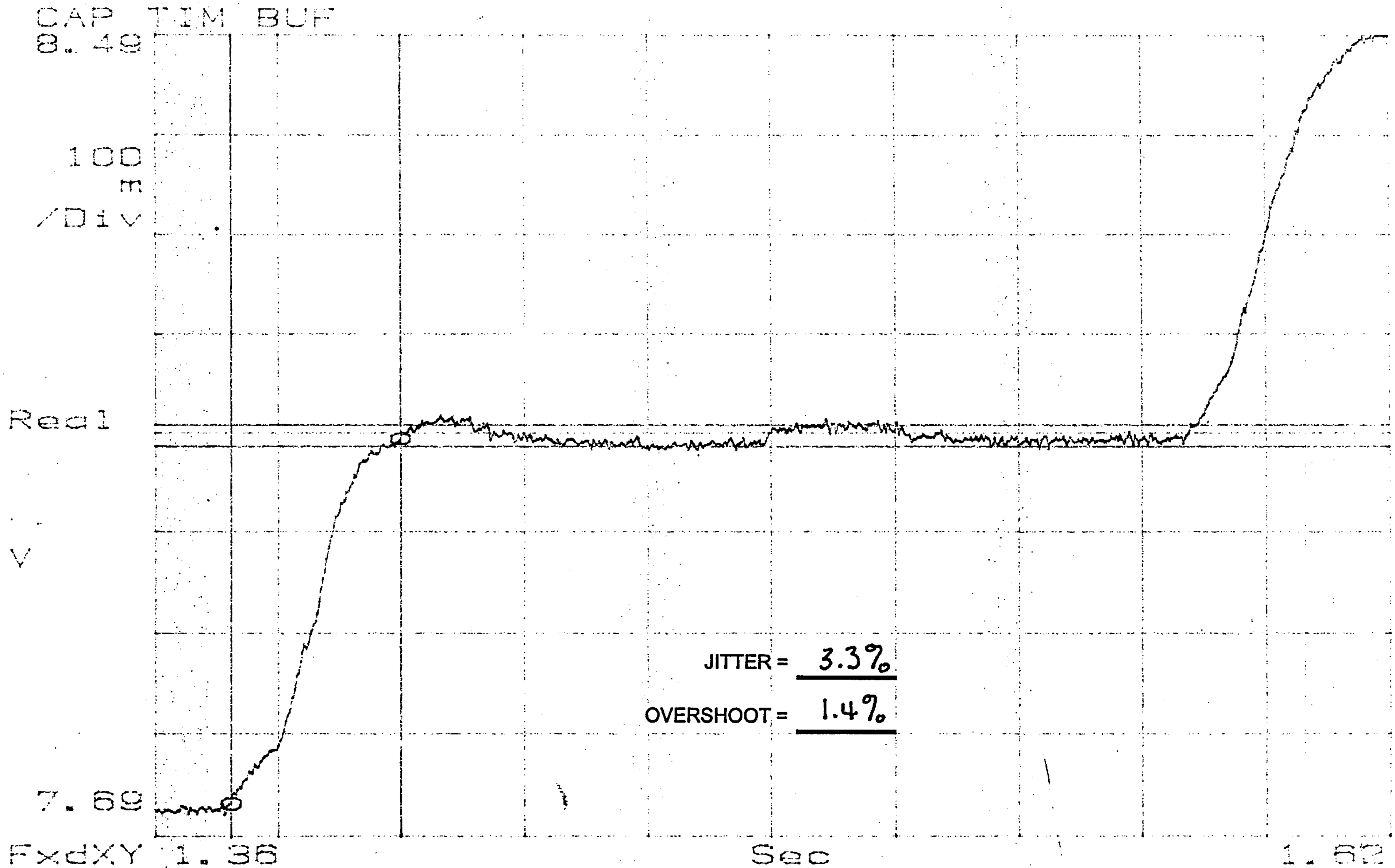
AE26002/2D
PARA: 3.4.5.5 Step 14

AMSU-A2 S/N 105
7A 268

SCEN ___

FILE NAME: 7AP_FS1

X=1.415 S   ΔX=35.94mS   Y=8.09824   ΔY=22.3mV
Ya=8.08317   ΔYa=361.7mV



AE26002/2D

PARA: 3.4.5.5 Step 15

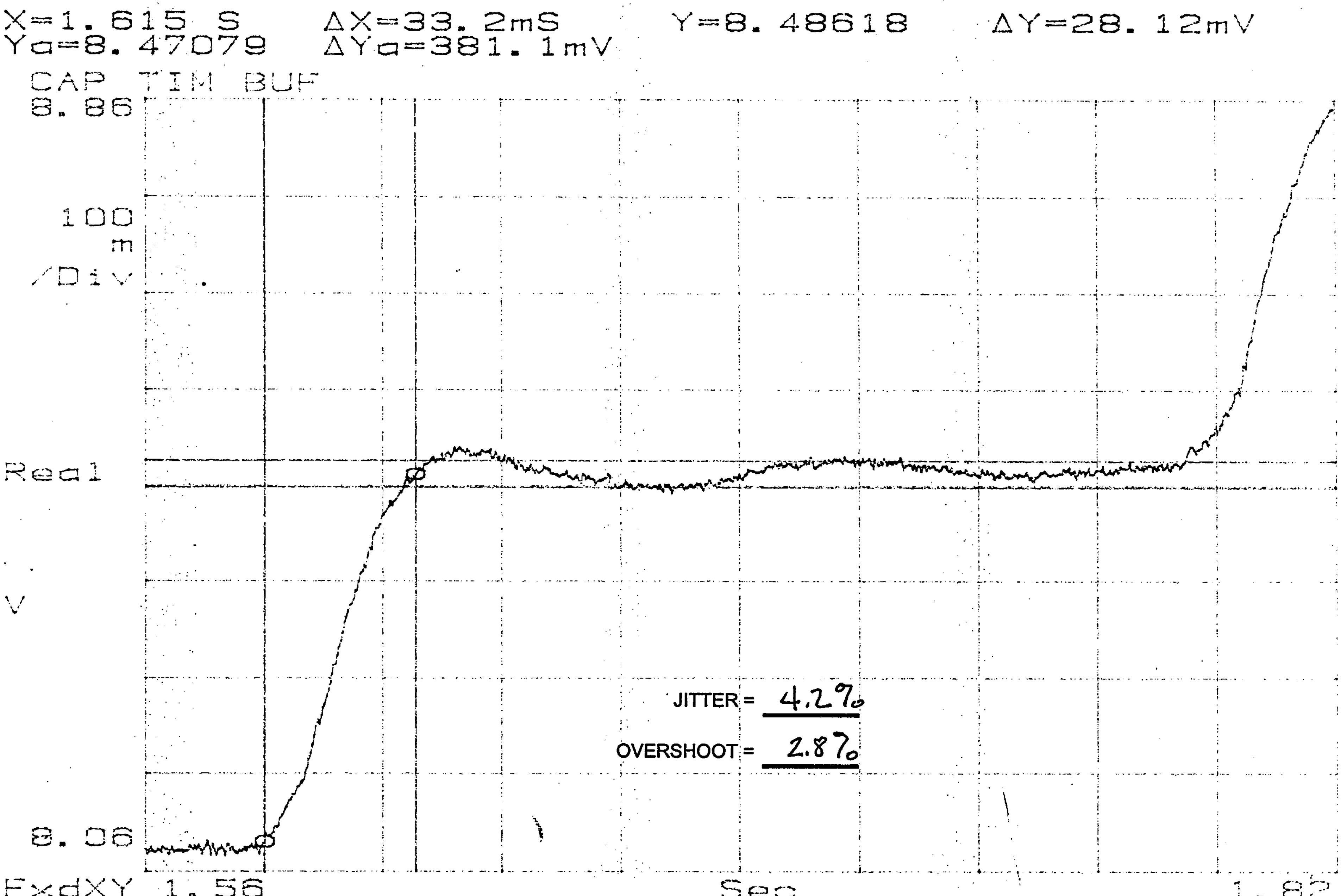
AMSU-A2
S/N 105

7A 268 MAY 28 '98

BS

SCEN 1

FILE NAME: 7AP_FS1



AE26002/2D

PARA: 3.4.5.5 Step 16

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S/N 105

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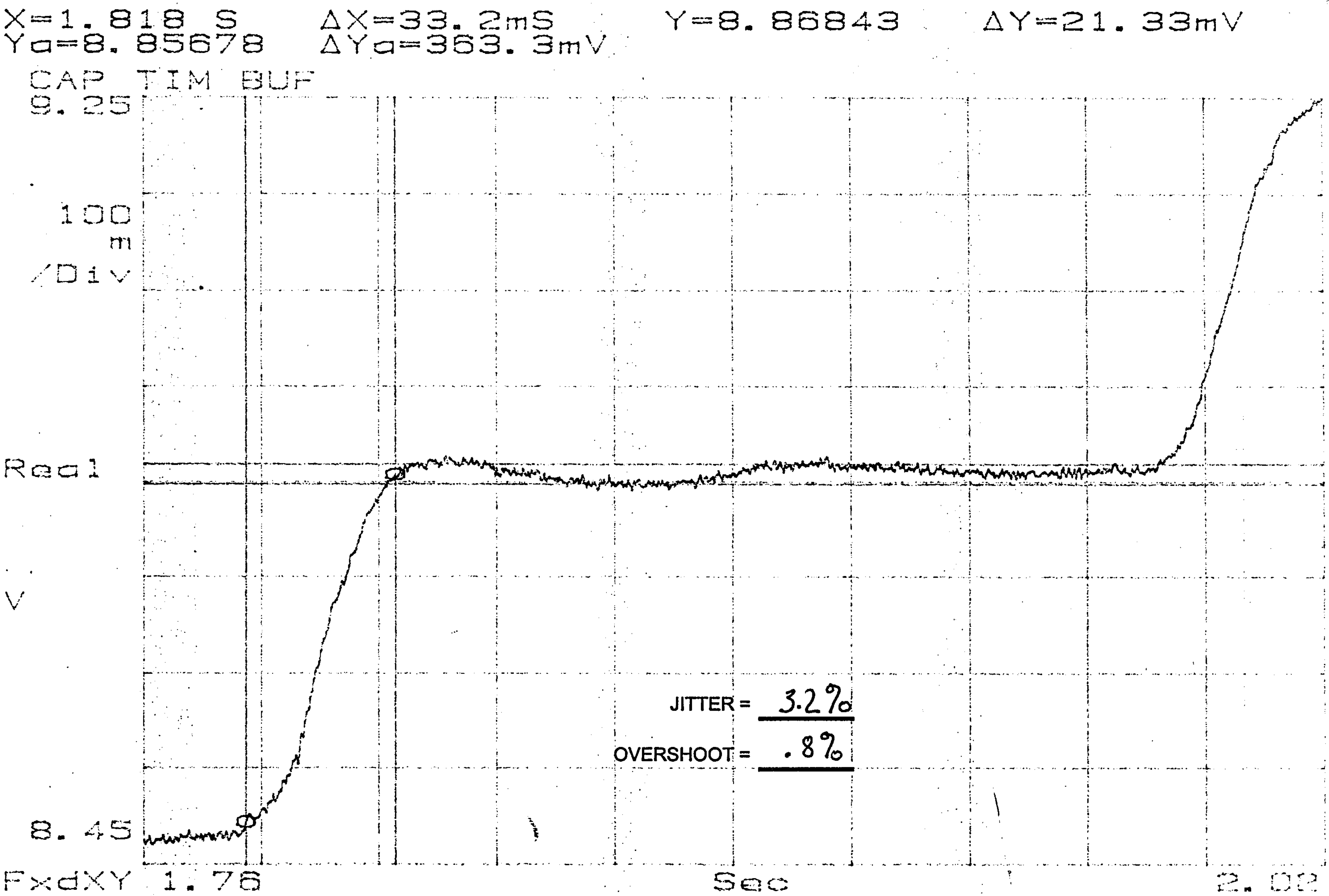
SCEN 10
FILE NAME: 7AP_FS1



AE26002/2D
PARA: 3.4.5.5 Step 17

AMSU-A2
S/N 105

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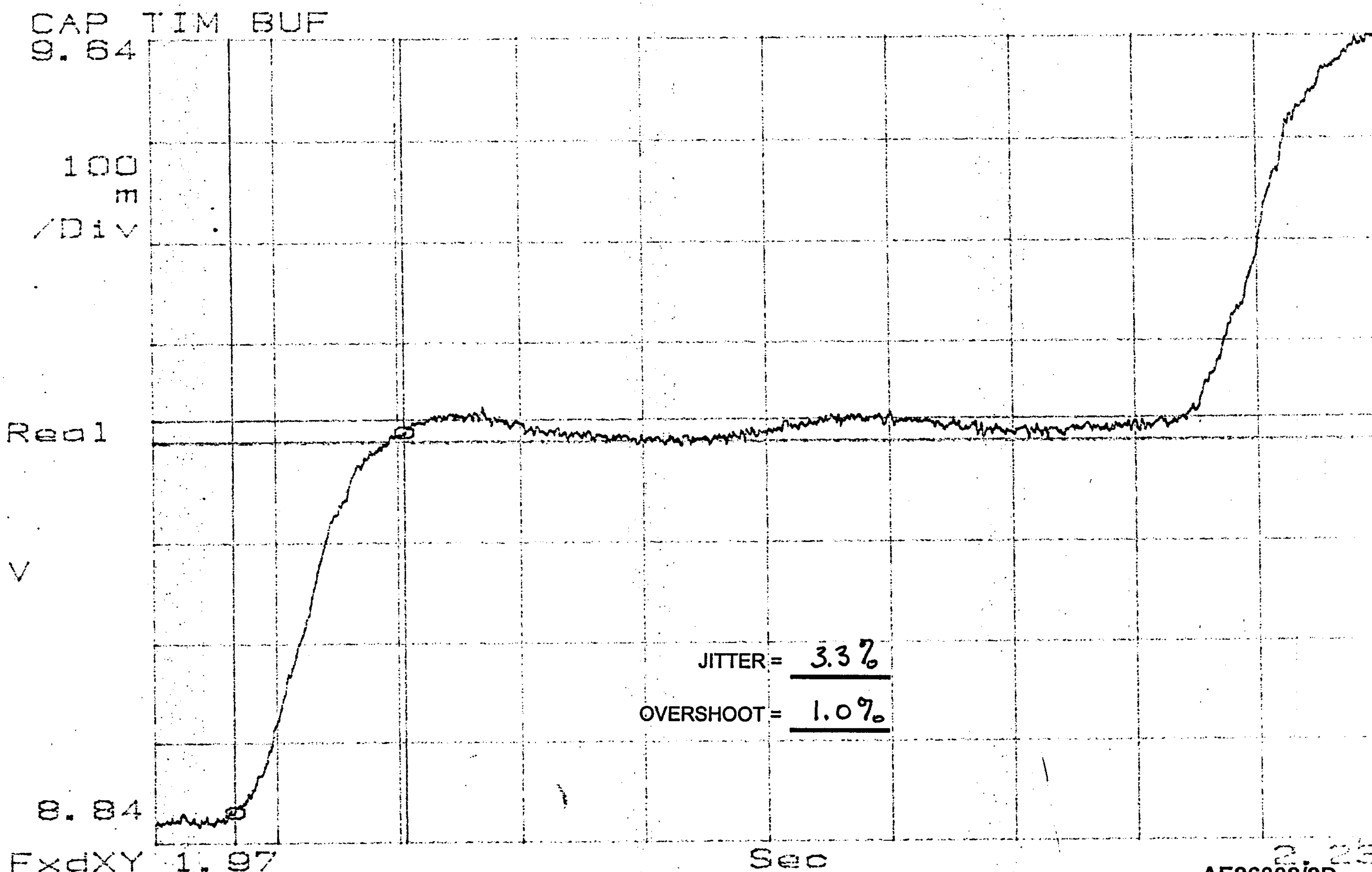
SCEN 11

FILE NAME: 7AP_FS1

X=2.025 S ΔX=36.33mS Y=9.26327 ΔY=22.3mV
Ya=9.24926 ΔYa=379.5mV



JITTER = 3.3%

OVERSHOOT = 1.0%

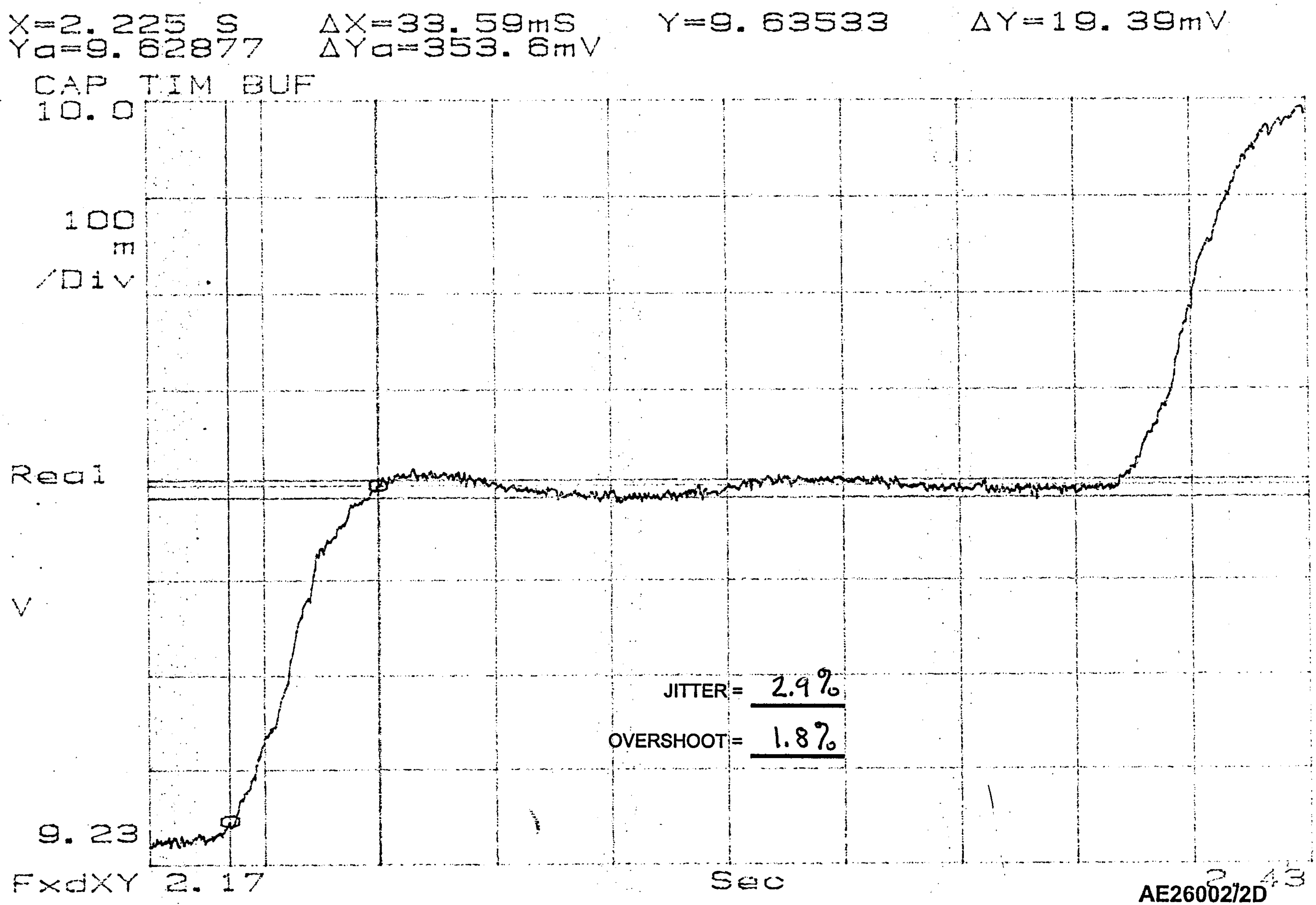
AE26002/2D

PARA: 3.4.5.5 Step 18

AMSU-A2 (7A 268)
S/N 105

MAY 28 '98

FILE NAME: 7AP_FS1



AE26002/2D
PARA: 3.4.5.5 Step 19

AMSU-A2
S/N 105

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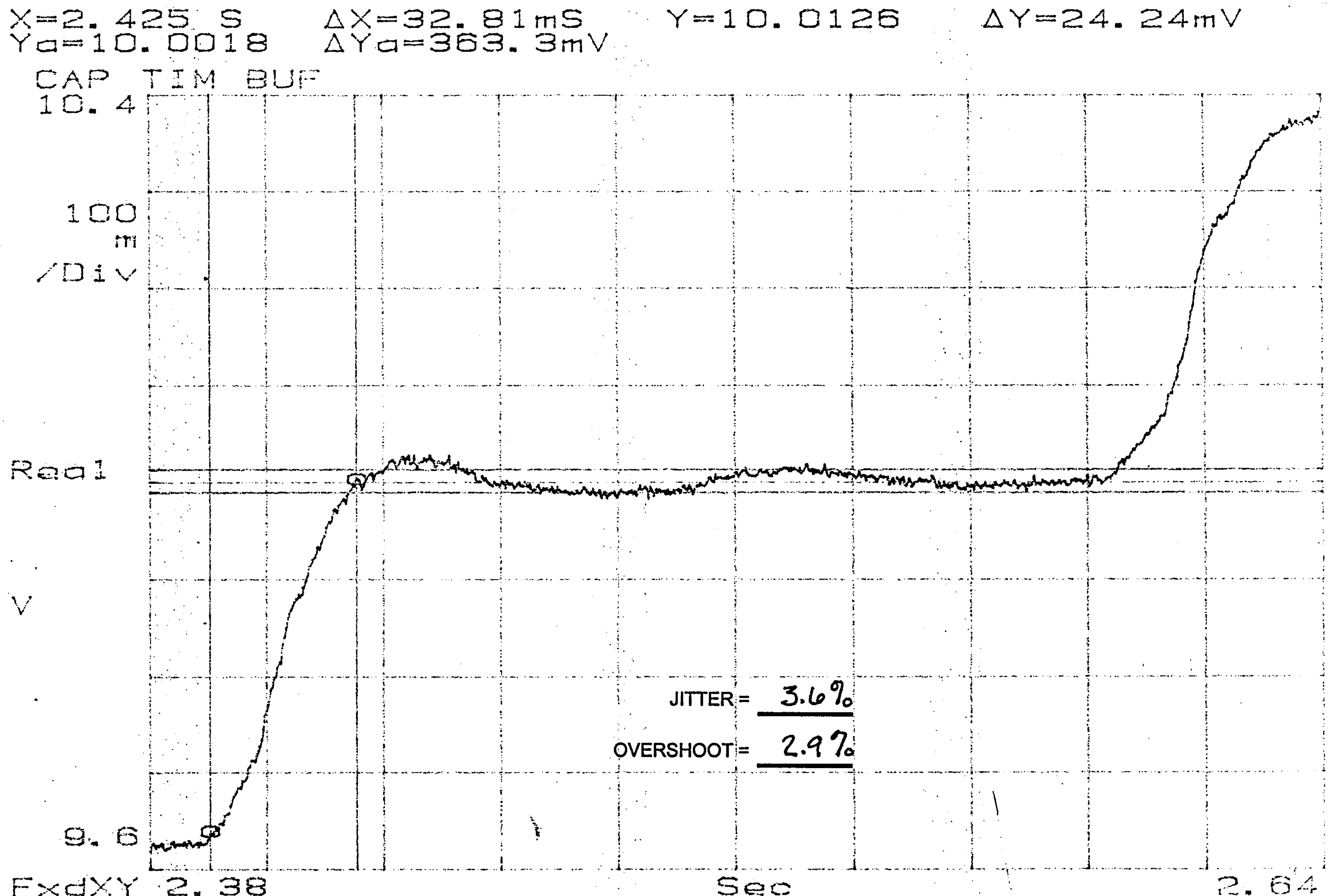
MAY 28 98

B1

SCEN. 15
FILE NAME: 7AP_FS1



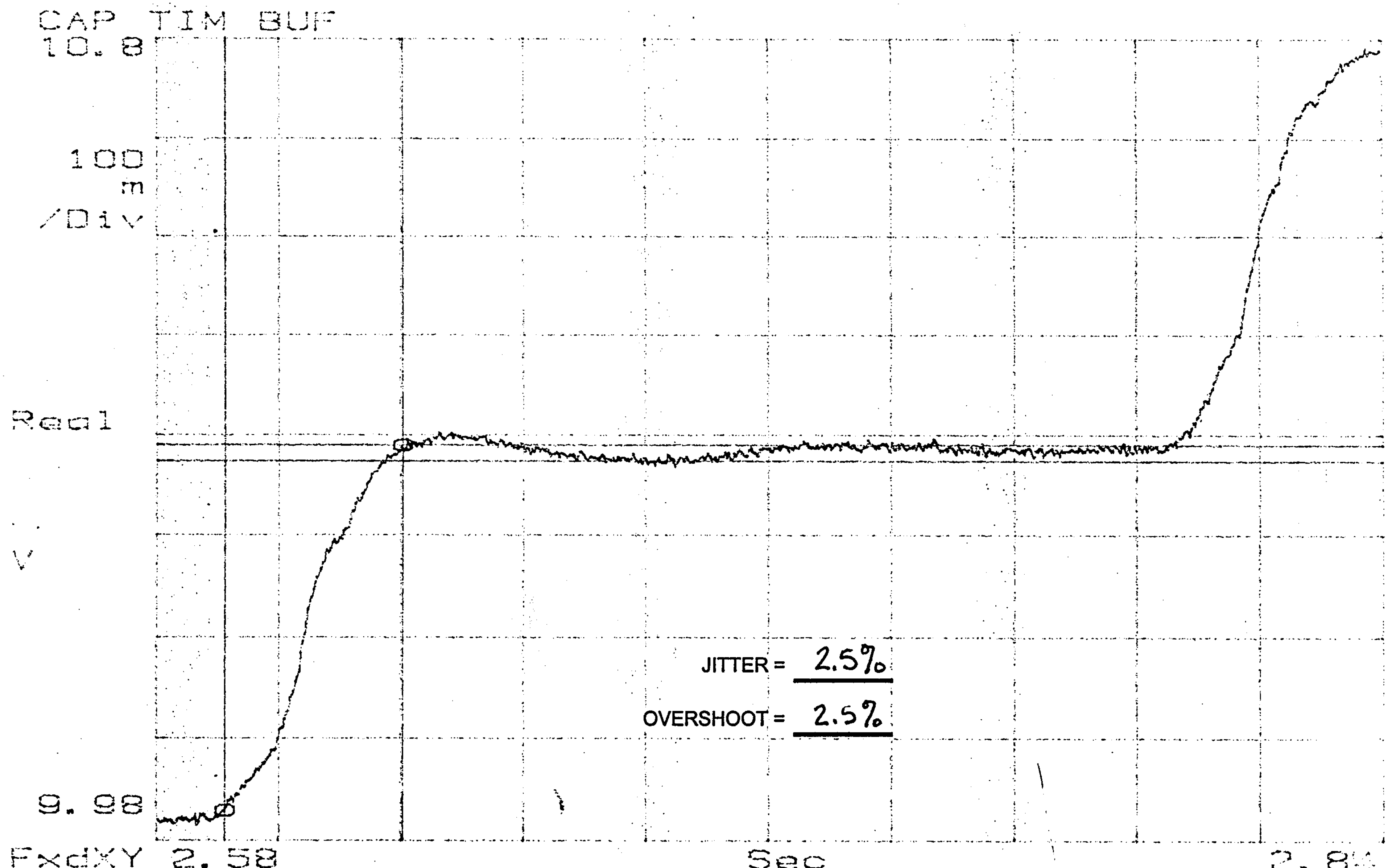
AE26002/2D
PARA: 3.4.5.5 Step 20

AMSU-A2
S/N 105

7A 268 MAY 28 '98

SCEN 14
FILE NAME: 7AP_FS1

X=2.632 S ΔX=37.89mS Y=10.3693 ΔY=16.49mV
Ya=10.3683 ΔYa=360.0mV



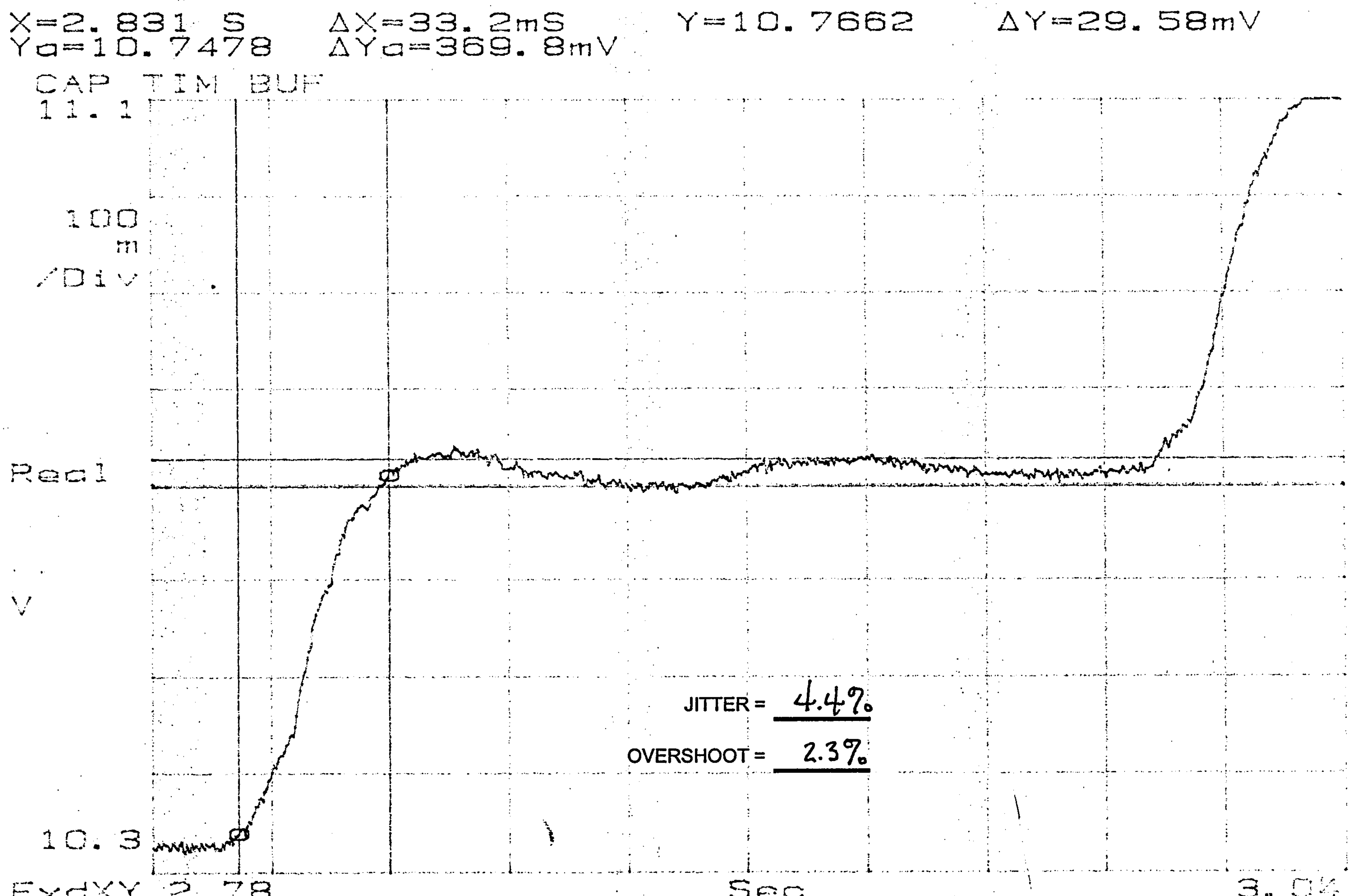
JITTER = 2.5%

OVERSHOOT = 2.5%

AE26002/2D
PARA: 3.4.5.5 Step 21

AMSU-A2
S/N 105
7A 268
JAY 28 '98

SCEN 15
FILE NAME: 7AP_FS1



AE26002/2D
PARA: 3.4.5.5 Step 22

AMSU-A2
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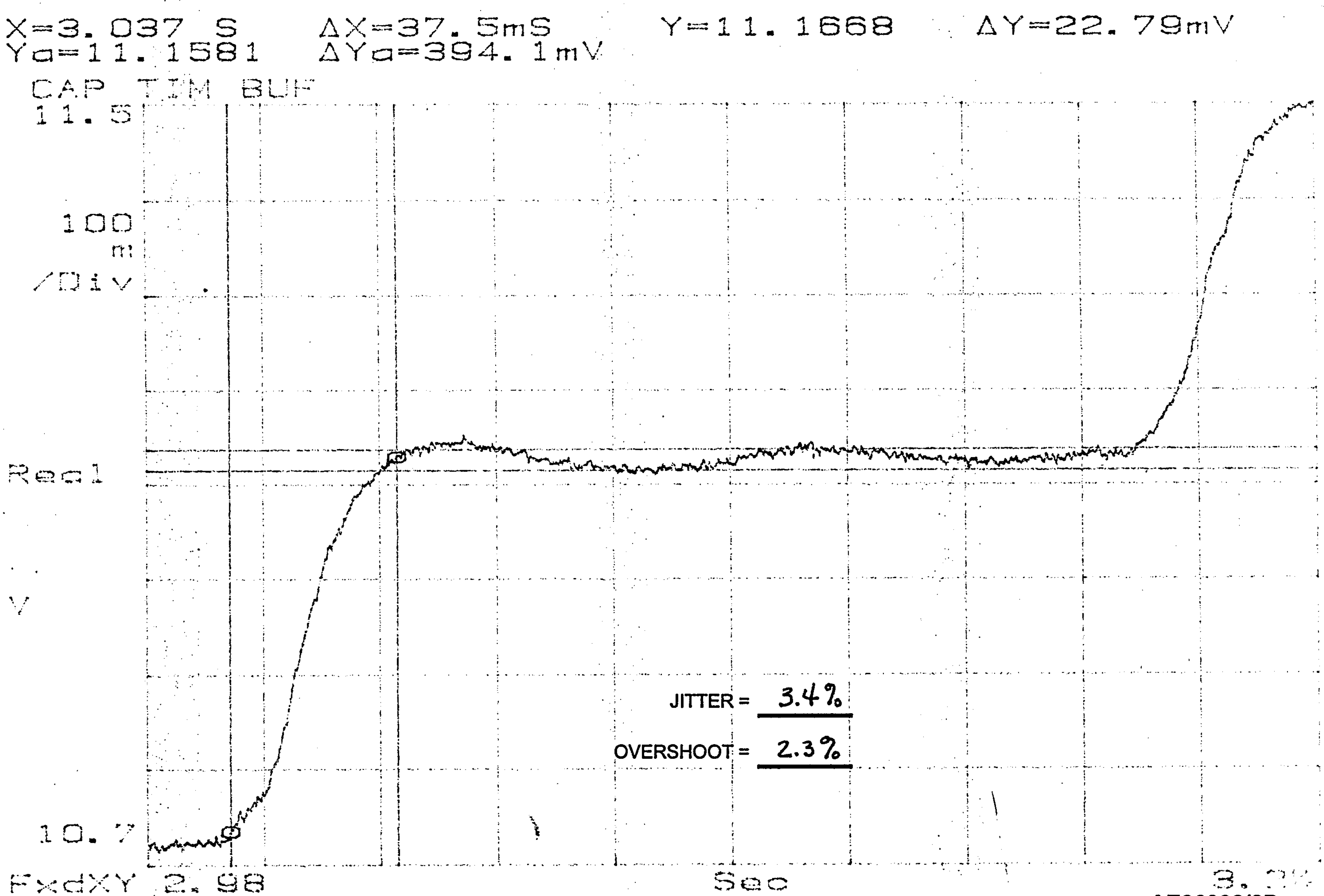
MAY 28 '98

FILE NAME: 7AP FS1



AE26002/2D
PARA: 3.4.5.5 Step 23

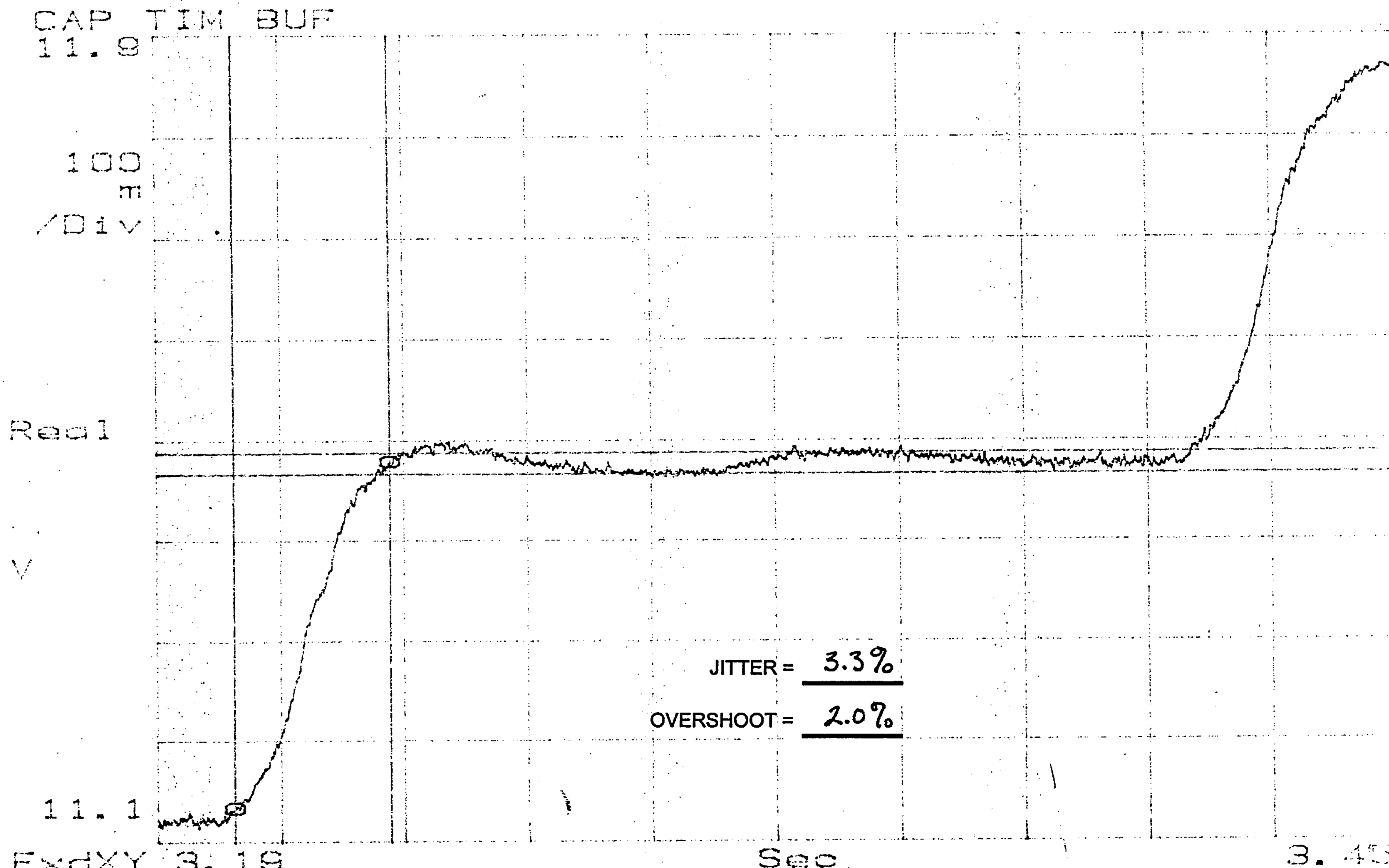
AMSU-A2
S/N 105
7A 268 MAY 28 '98

SCEN ___

FILE NAME: 7AP_FS1

X=3.236 S ΔX=33.2mS Y=11.5279 ΔY=21.82mV

Ya=11.5182 ΔYa=345.4mV



AE26002/2D

PARA: 3.4.5.5 Step 24

AMSU-A2

S/N 105

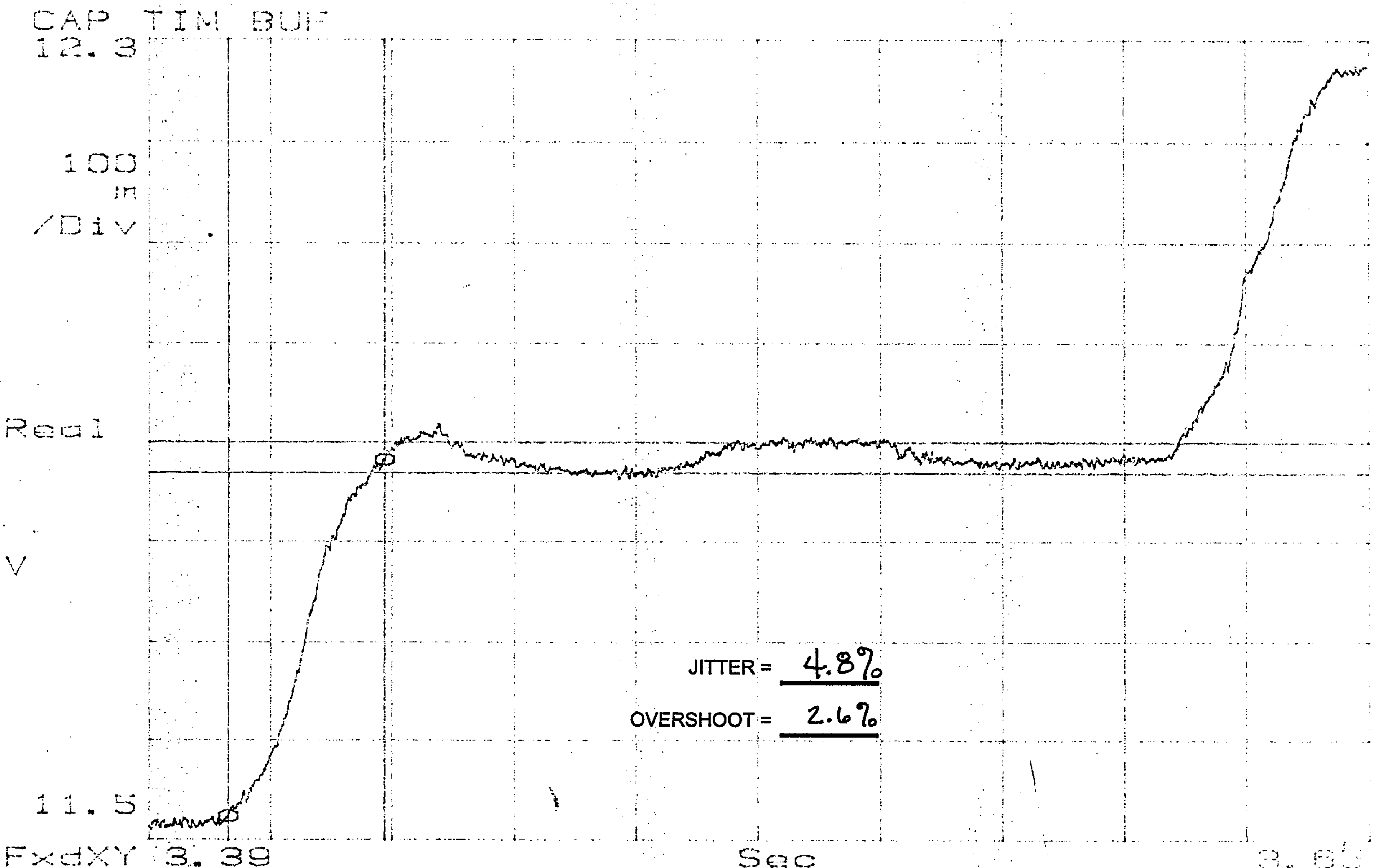
7A 268

MAY 28 '99

SCEN 15

FILE NAME: 7AP_FS1

X=3.438 S ΔX=33.59mS Y=11.9005 ΔY=32.0mV
Ya=11.8815 ΔYa=358.4mV



JITTER = 4.8%

OVERSHOOT = 2.6%

AE26002/2D

PARA: 3.4.5.5 Step 25

AMSU-A2
S/N 105

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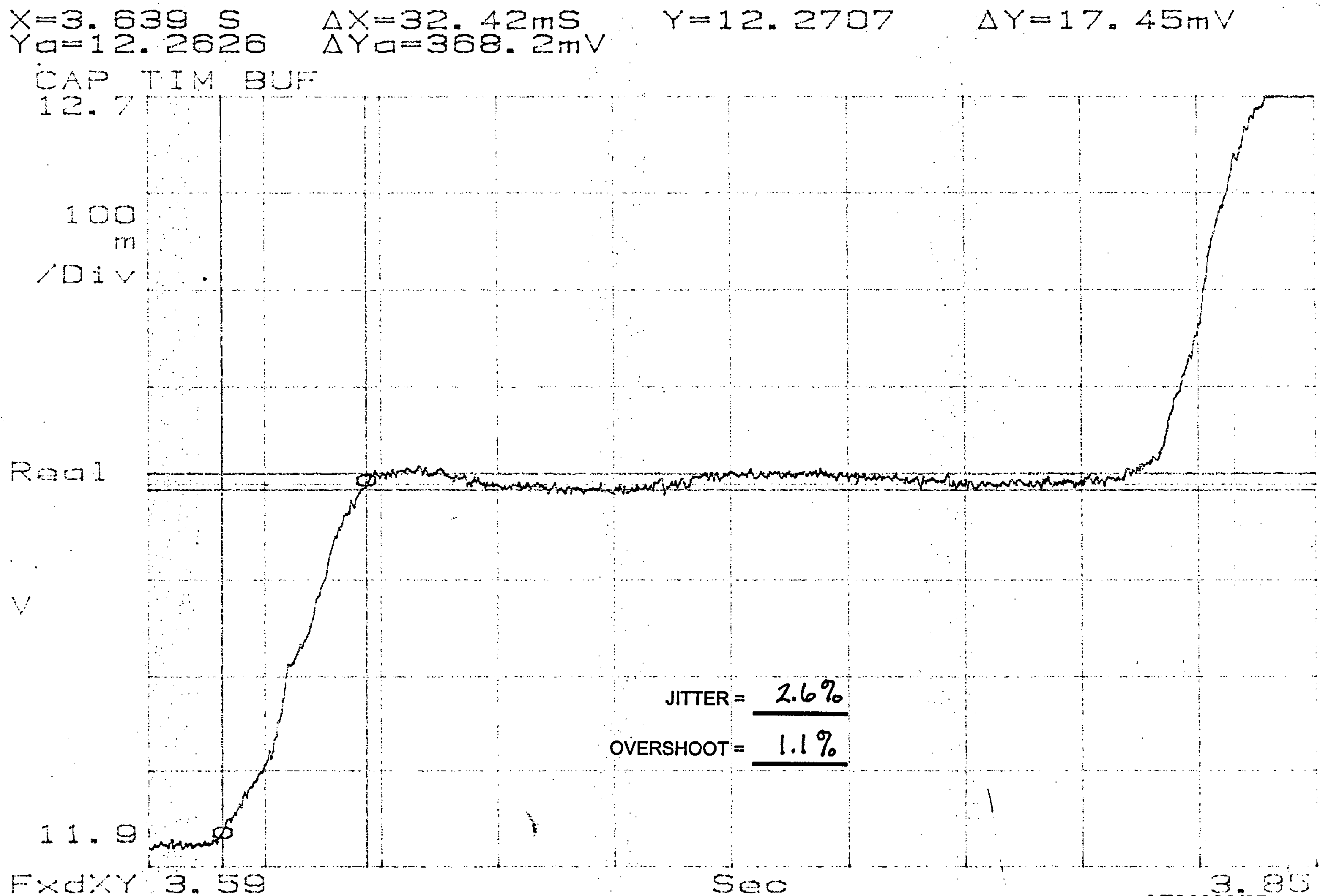
SCEN 14
FILE NAME: 7AP_FS1



AE26002/2D
PARA: 3.4.5.5 Step 26

AMSU-A2
S/N 105

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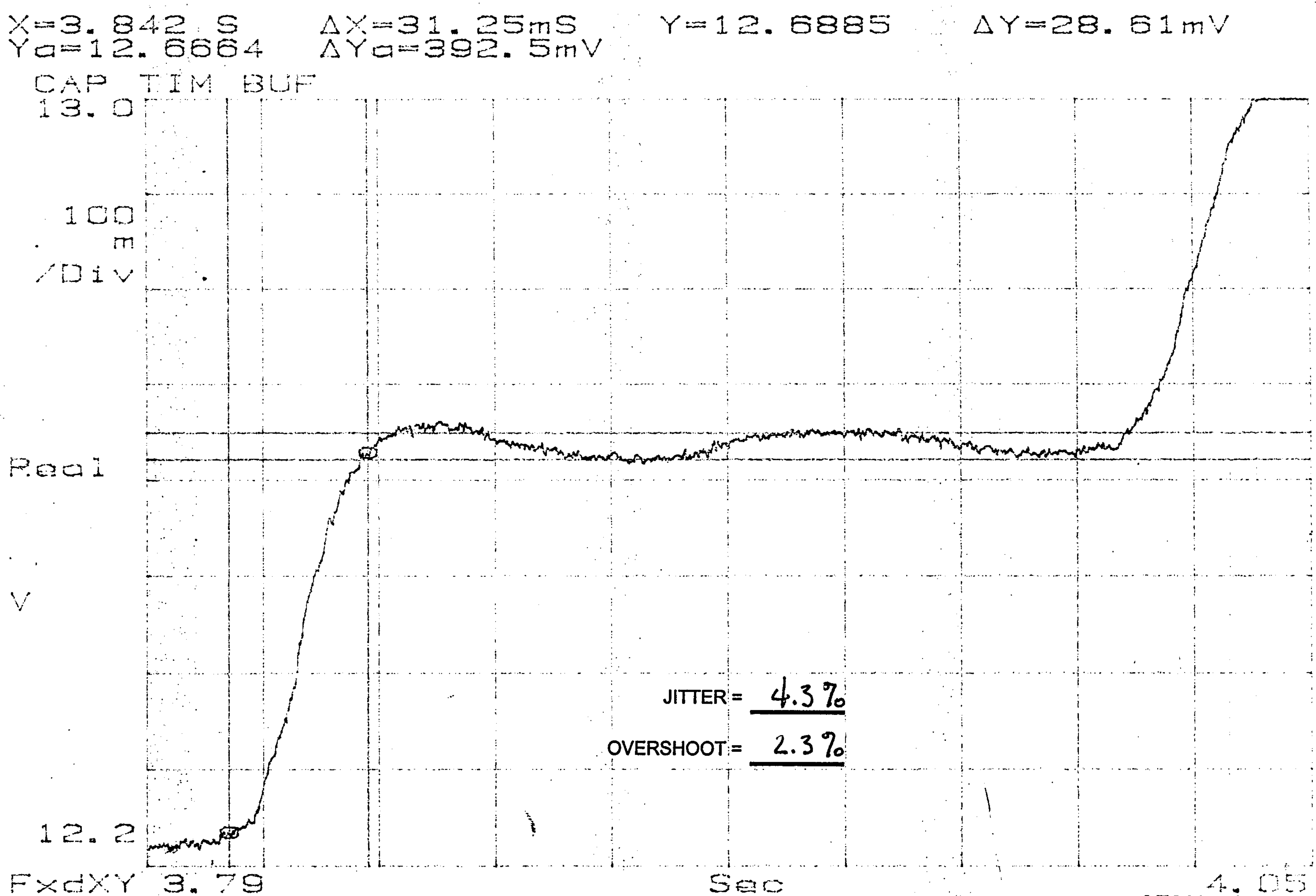
SCEN. 20
FILE NAME: 7AP FS1



JITTER = 4.3%

OVERSHOOT = 2.3%

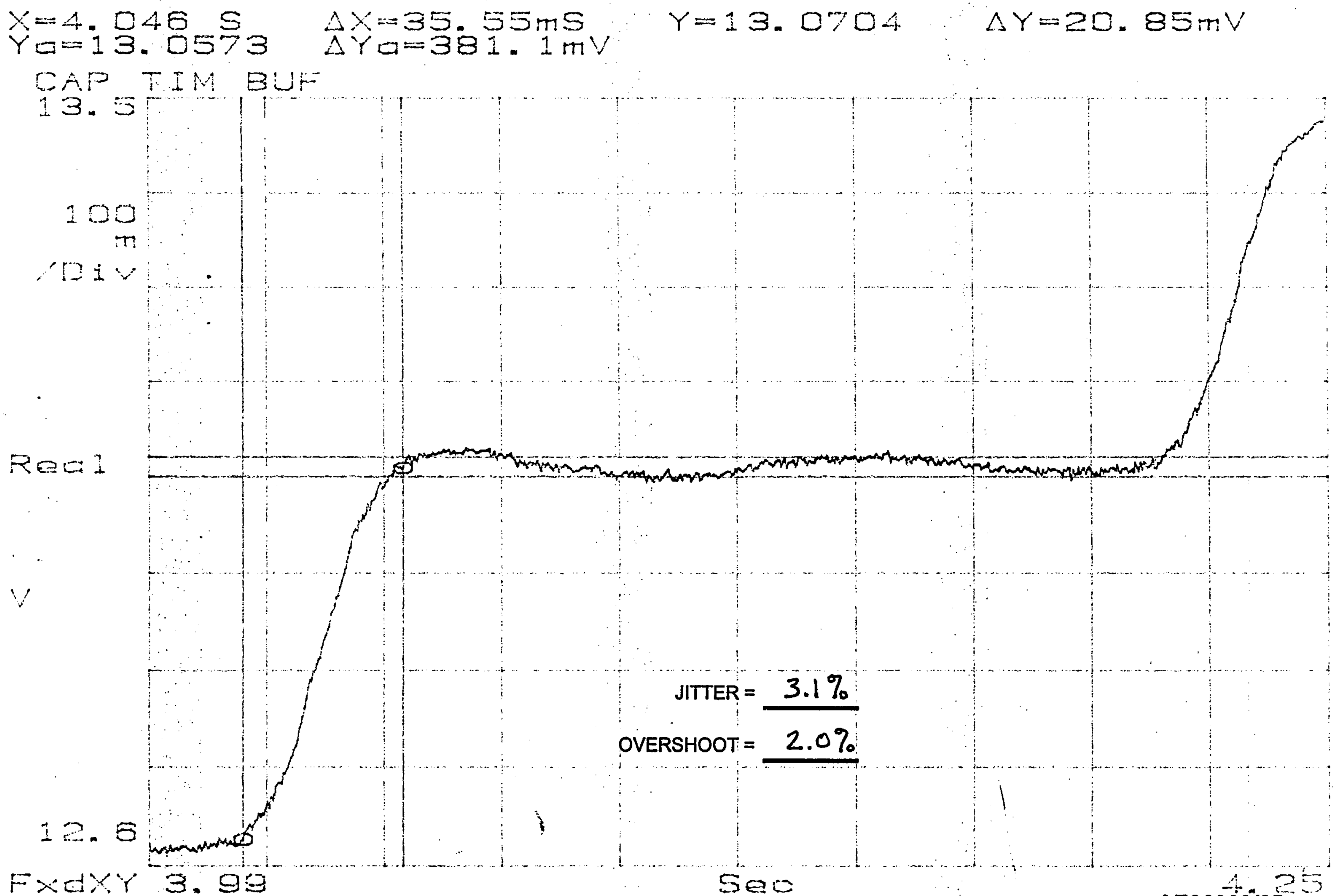
AE26002/2D
PARA: 3.4.5.5 Step 27

AMSU-A2
S/N 105

7A 268

MAY 28 '98

SCEN 21
FILE NAME: 7AP FS1

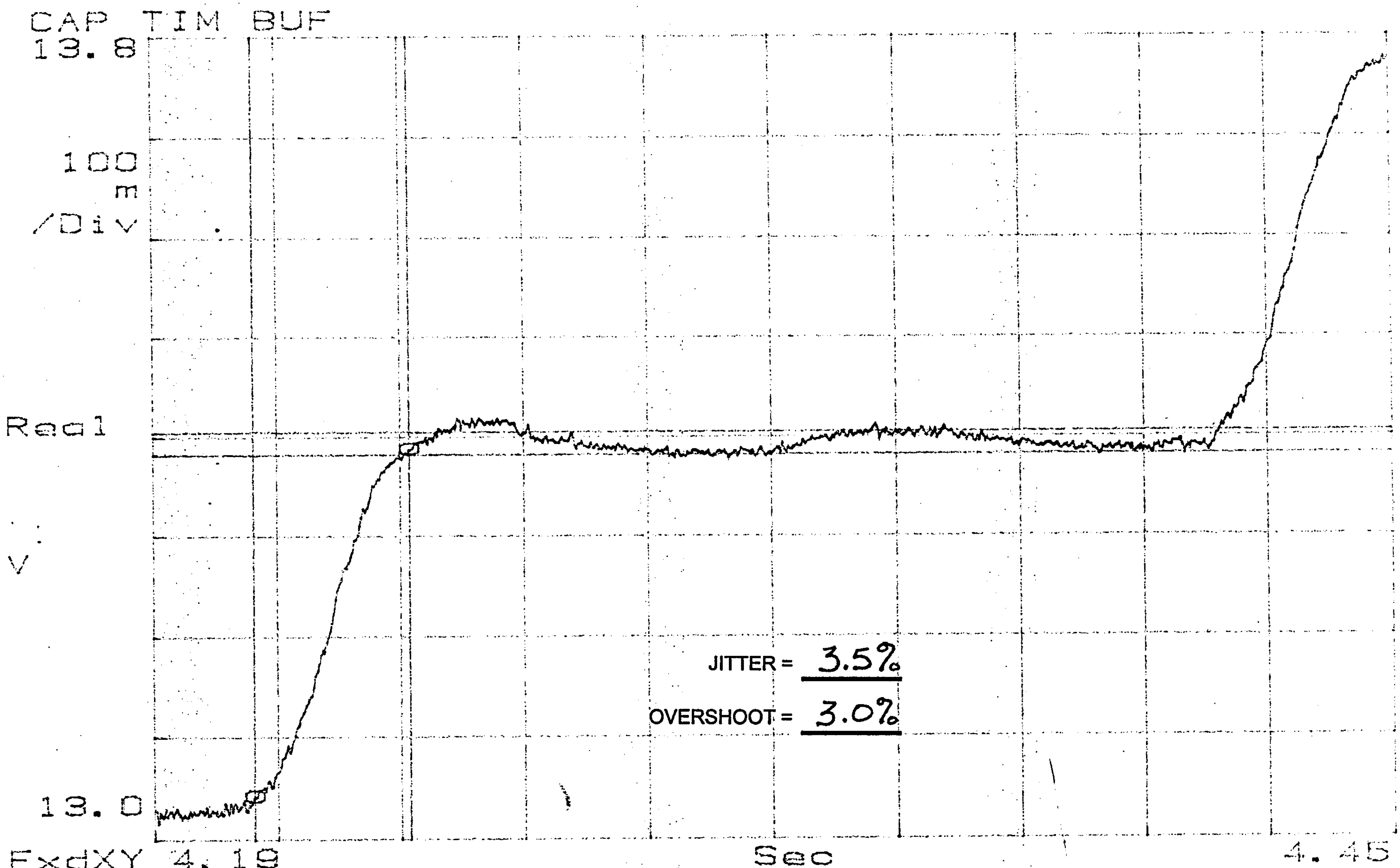


AE26002/2D
PARA: 3.4.5.5 Step 28

AMSU-A2 7A 268
S/N 105
MAY 28 '98

SCEN 22
FILE NAME: 7AP_FS1

X=4.247 S ΔX=32.81mS Y=13.4348 ΔY=23.27mV
Ya=13.4174 ΔYa=345.4mV



JITTER = 3.5%

OVERSHOOT = 3.0%

AE26002/2D
PARA: 3.4.5.5 Step 29

AMSU-A2
S/N 105

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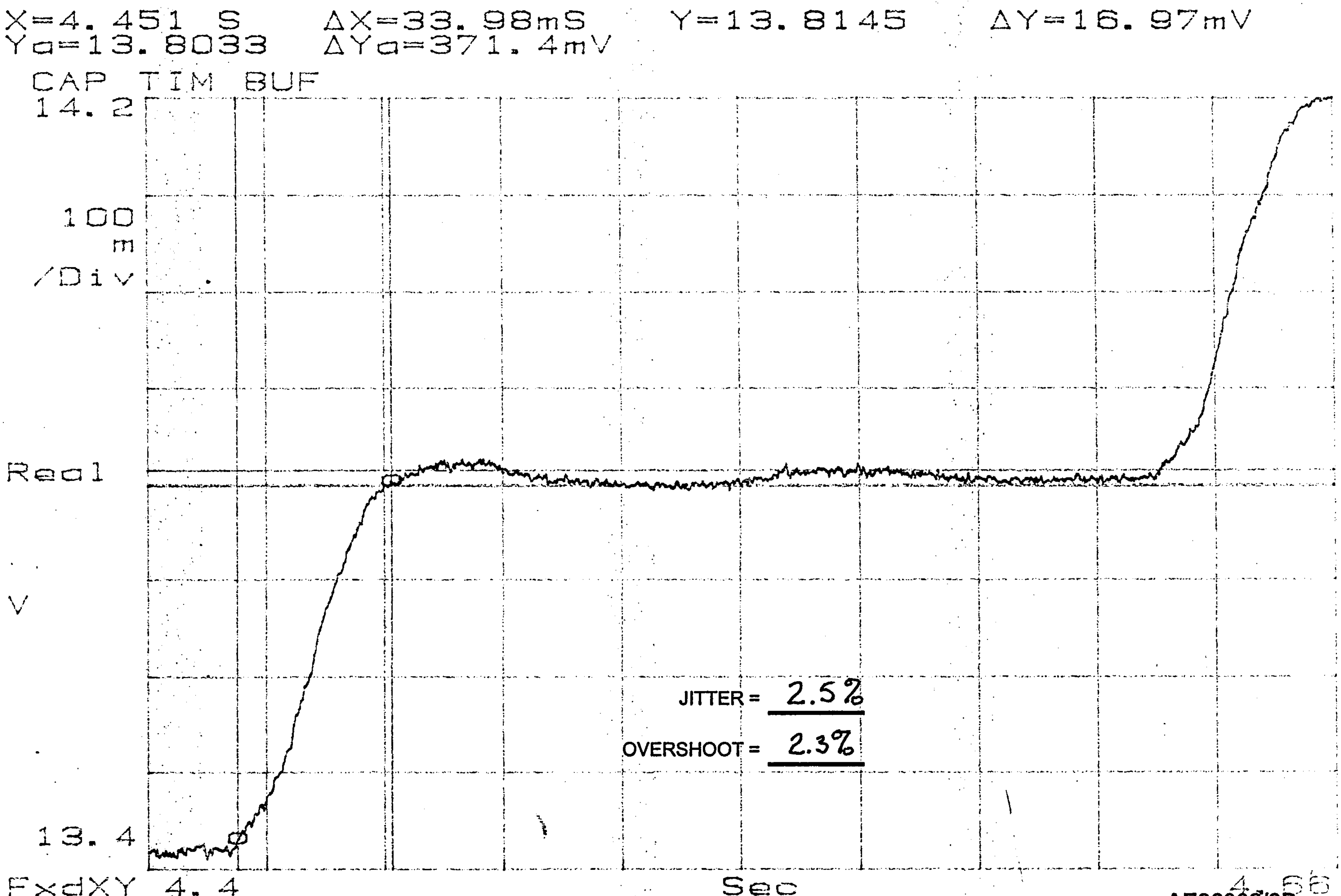
MAY 28 '98

FILE NAME: 7AP_FS1



JITTER = 2.5%

OVERSHOOT = 2.3%

AE26002/2D

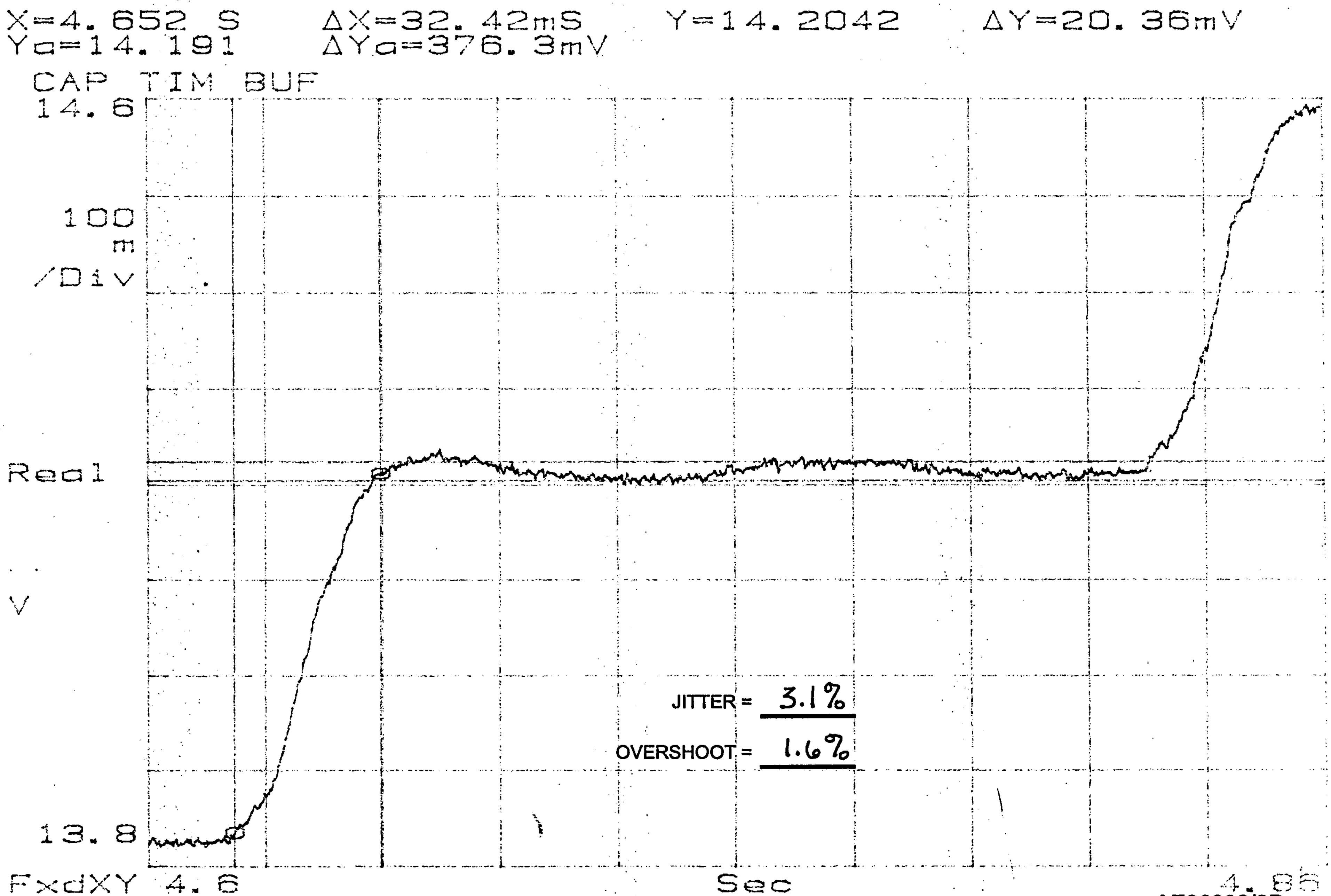
PARA: 3.4.5.5 Step 30

Amsu-A2
S/N 105

7A 268

MAY 28 '98

SCEN 24
FILE NAME: 7AP_FS1



AE26002/2D
PARA: 3.4.5.5 Step 31

AMSU-A2
S/N 105

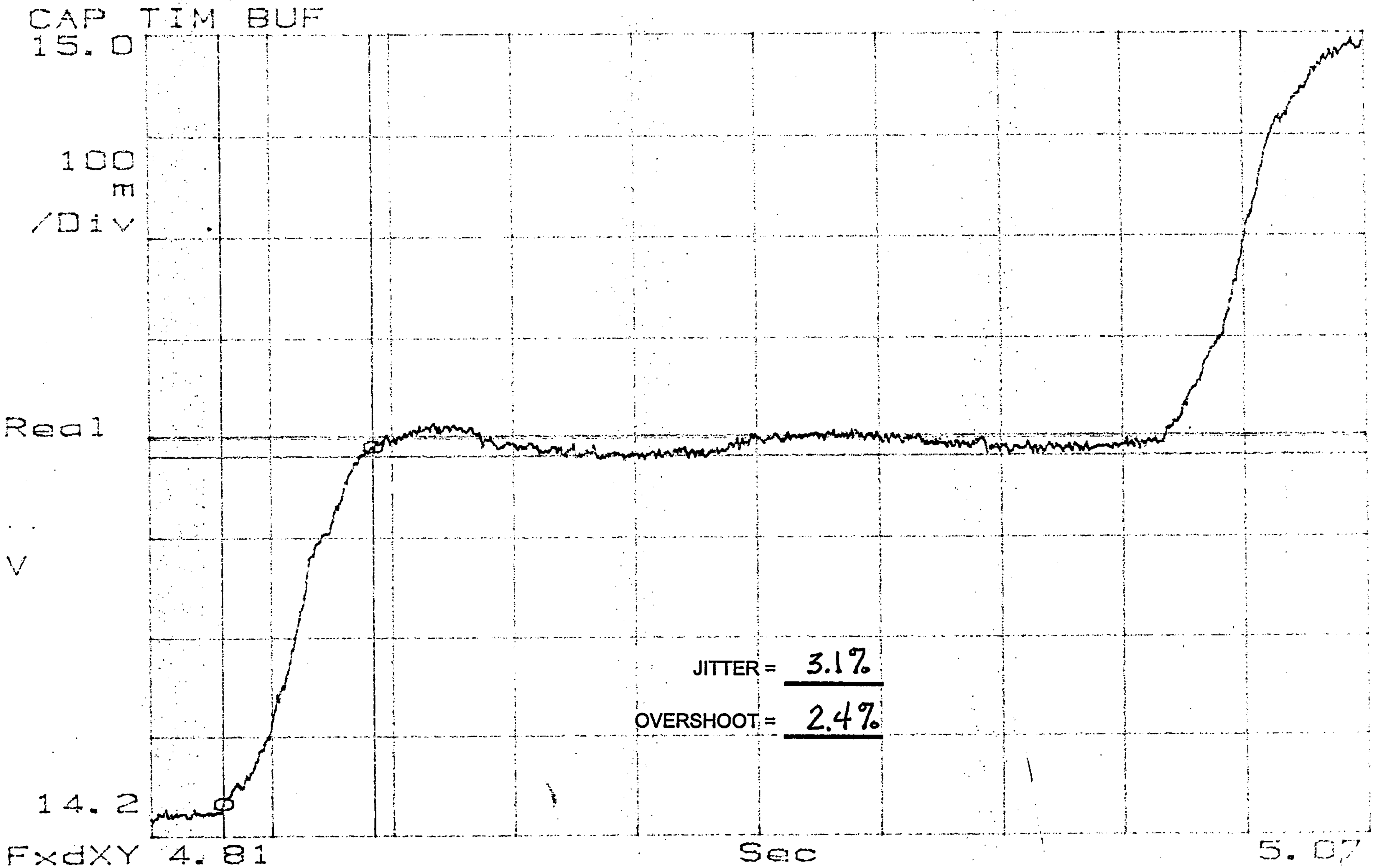
7A 268 MAY 28 '98

SCEN 23

FILE NAME: 7AP_FS1

X=4.854 S   ΔX=32.42mS   Y=14.5724   ΔY=20.85mV

Ya=14.5607   ΔYa=358.4mV



AE26002/2D

PARA: 3.4.5.5 Step 32

AMSU-A2

S/N 105

A 268

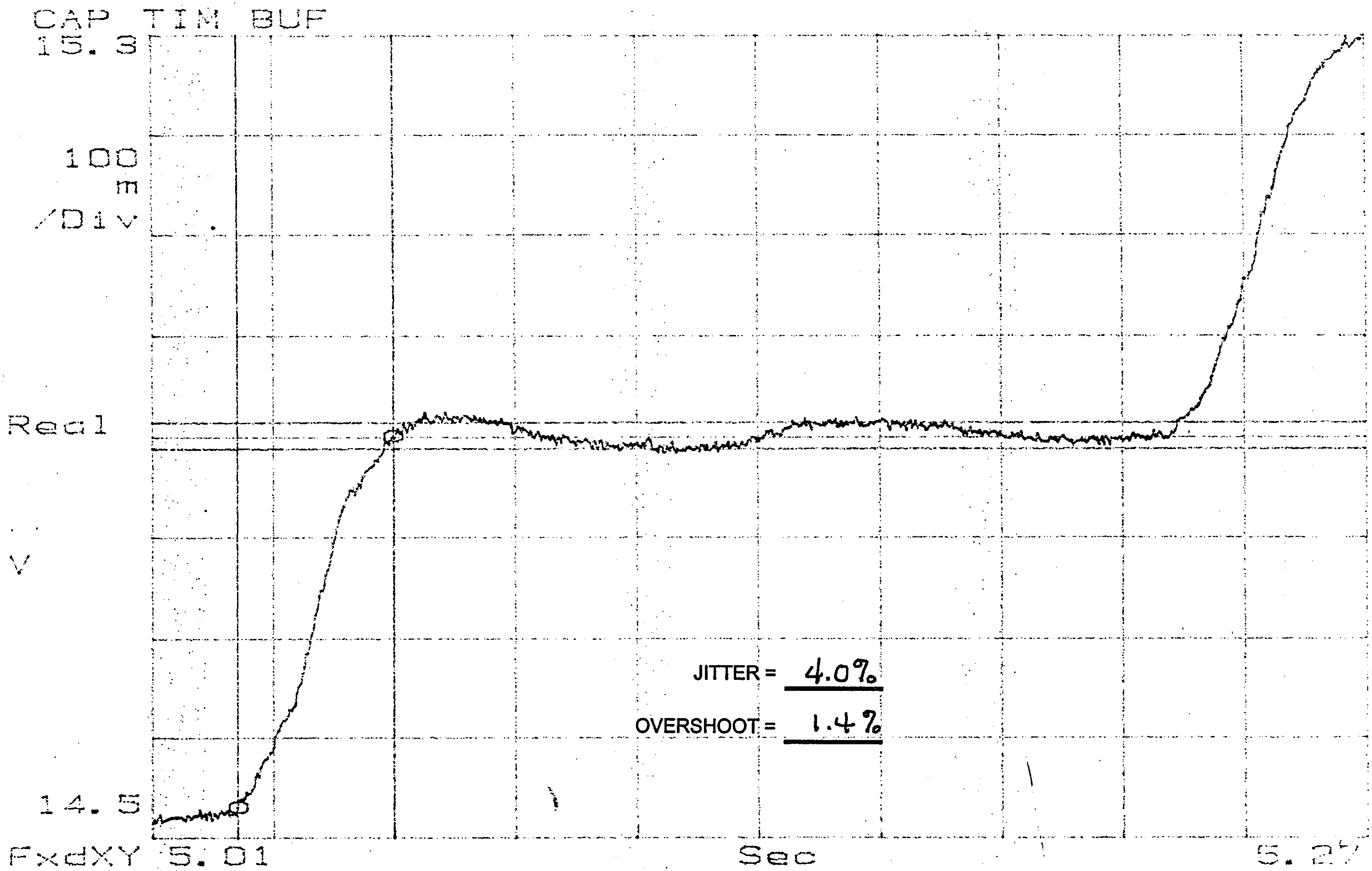
MAY 28 '98

SCEN. 26

FILE NAME: 7AP_FS1

X=5.058 S ΔX=33.59mS Y=14.9545 ΔY=26.67mV

Ya=14.9402 ΔYa=369.8mV



JITTER = 4.0%

OVERSHOOT = 1.4%

AE26002/2D

PARA: 3.4.5.5 Step 33

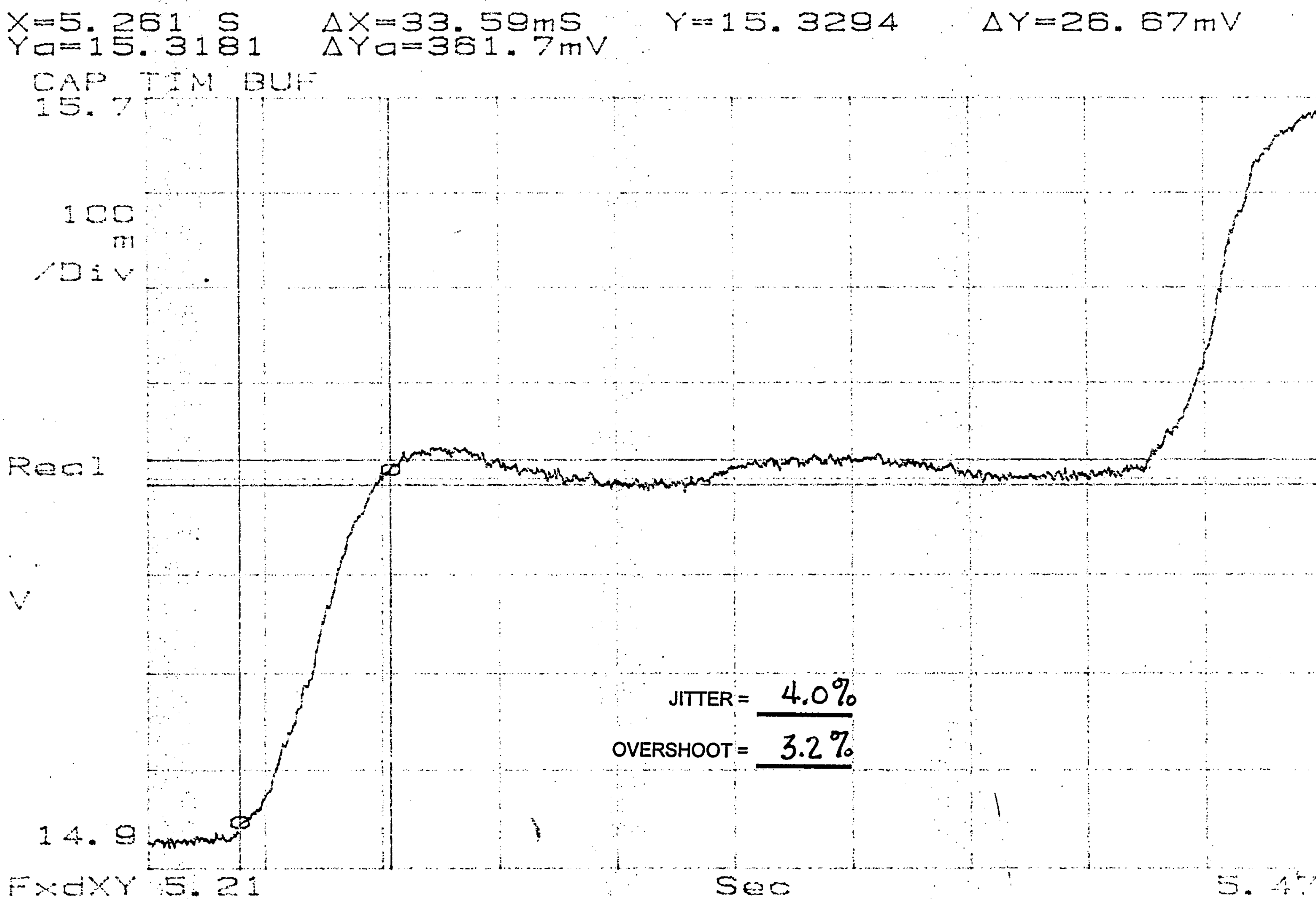
AMSU-A2

S/N105

7A 268

MAY 28 '98

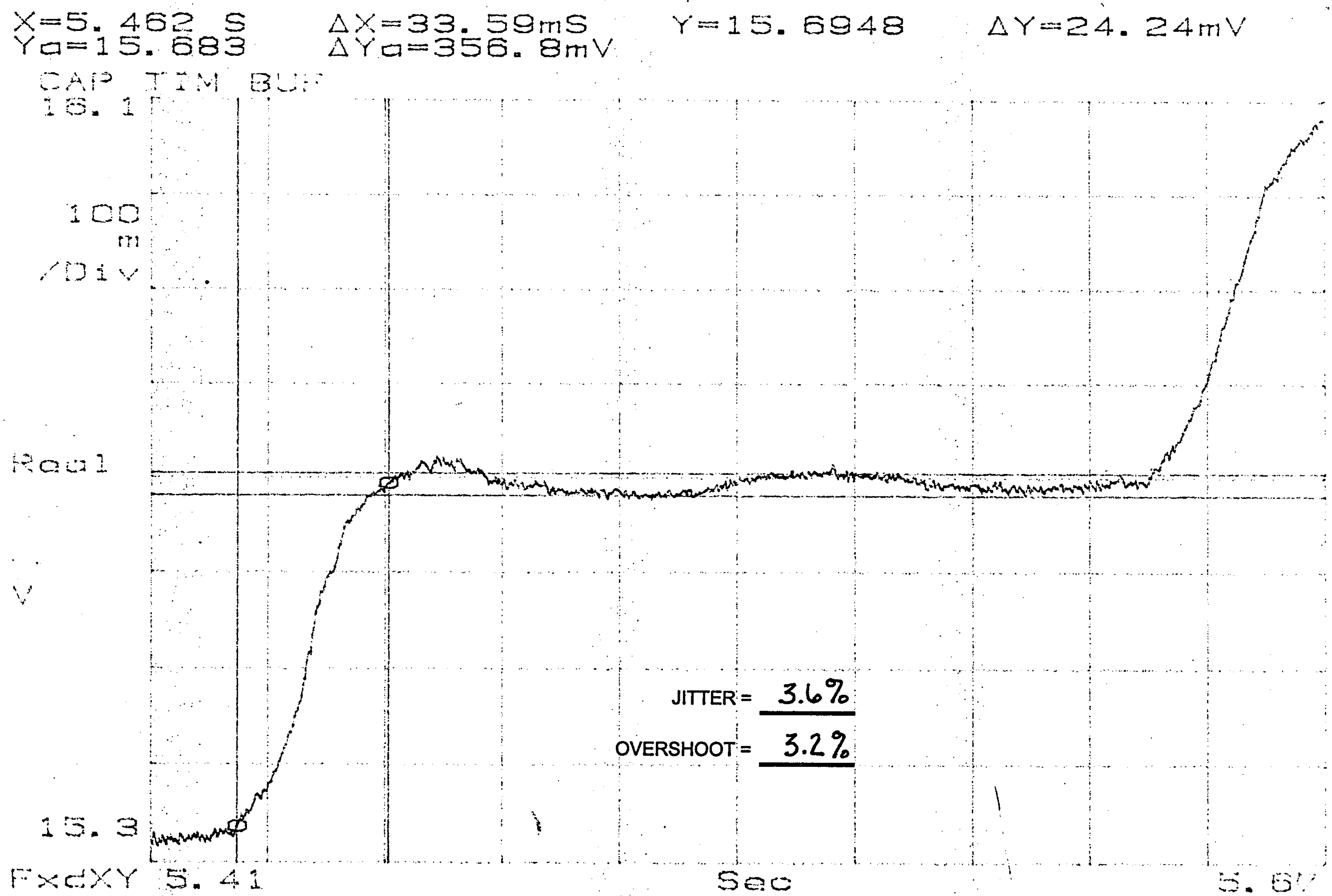
SCEN 27
FILE NAME: 7AP_FS1



AE26002/2D
PARA: 3.4.5.5 Step 34

AMSU-A2
S/N 105
7A 268
MAY 28 '98

SCEN 28
FILE NAME: 7AP_FS1



AE26002/2D
PARA: 3.4.5.5 Step 35

AMSU-A2
S/N 105

7A 268

MAY 28 '98

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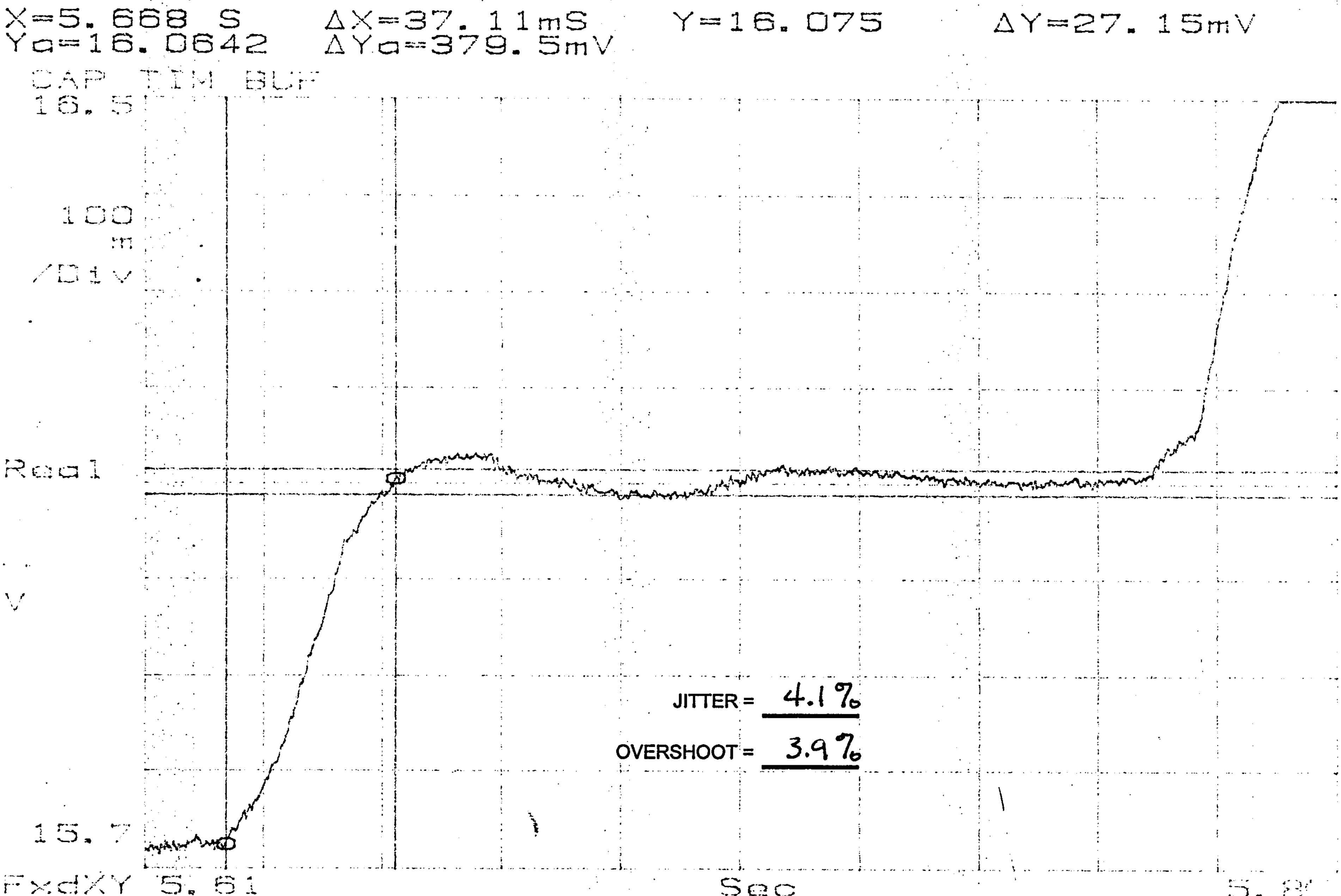
SCEN 24
FILE NAME: 7AP FS1



AE26002/2D
PARA: 3.4.5.5 Step 36

AMSU-A2
S/N 105
7A 268
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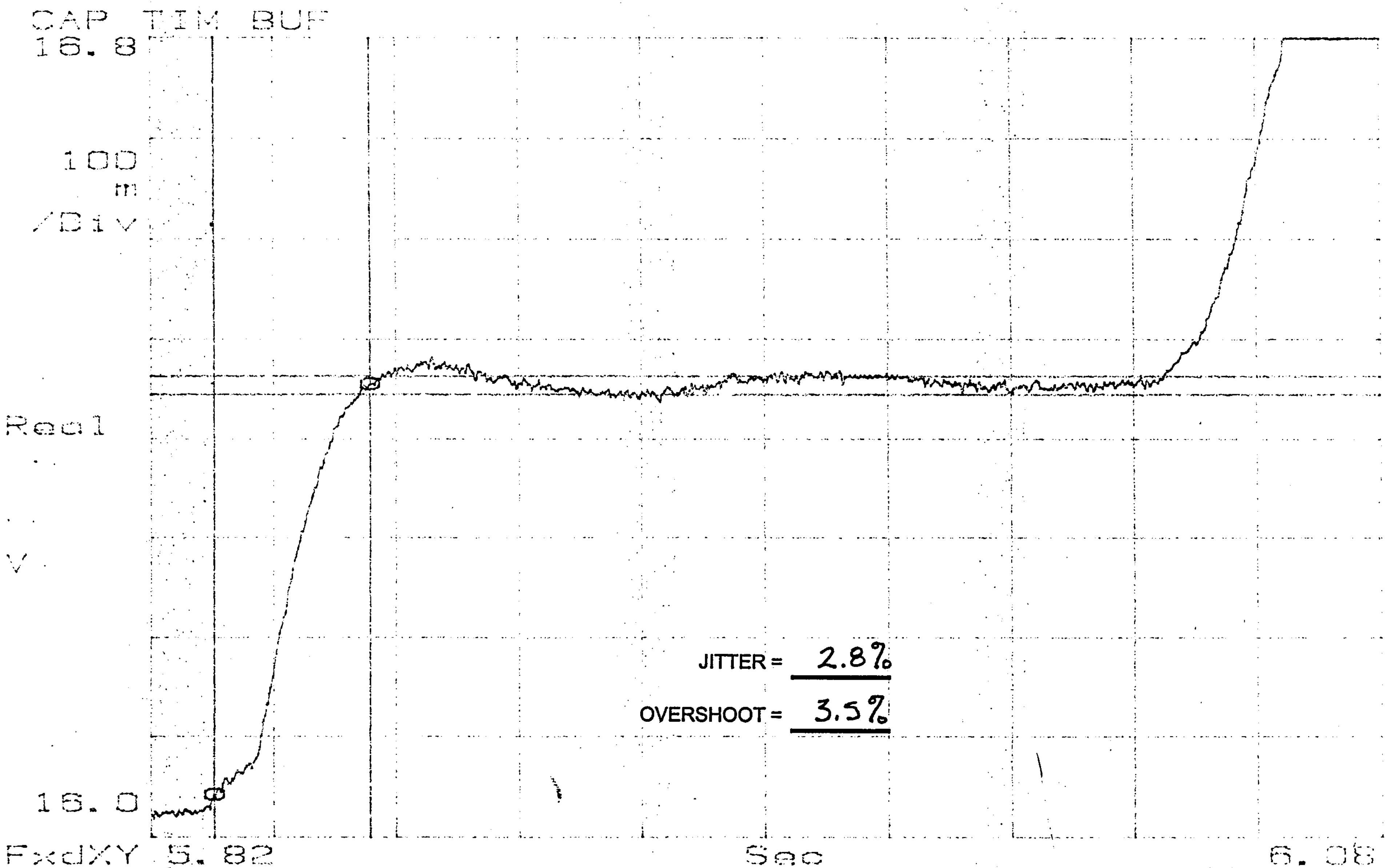
SCEN 30

FILE NAME: 7AP_FS1

X=5.868 S ΔX=33.2mS Y=16.503 ΔY=18.91mV

Ya=16.4939 ΔYa=411.9mV



AE26002/2D

PARA: 3.4.5.5 Step 37

AMSU-A2

S/N 105

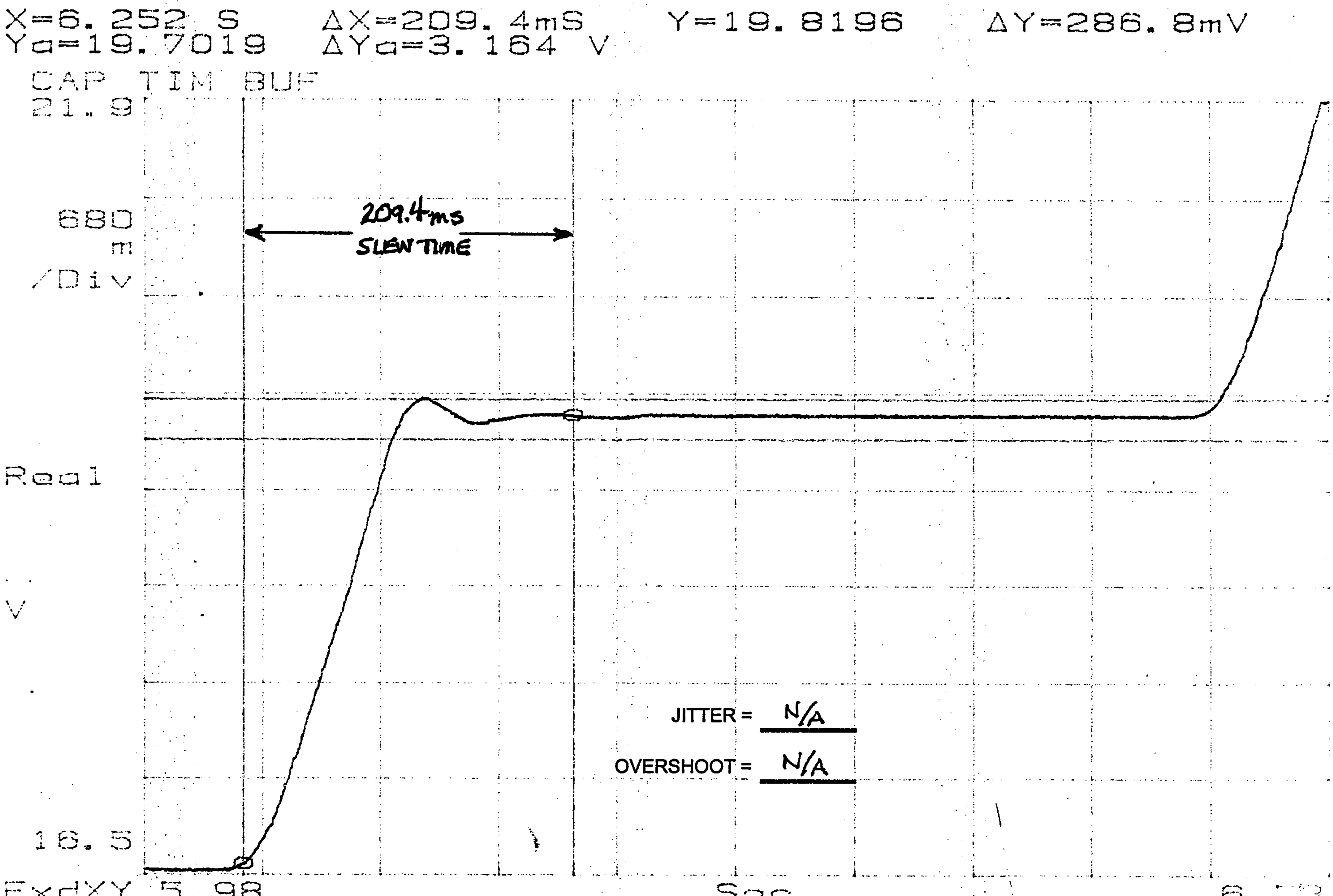
A 268

MAY 28 '98

B36

SCEN Cold Cal

FILE NAME: 7AP_FS1



AMSU-A2
S/N 105

7A 268

AE26002/2D

PARA: 3.4.5.5 Step 38

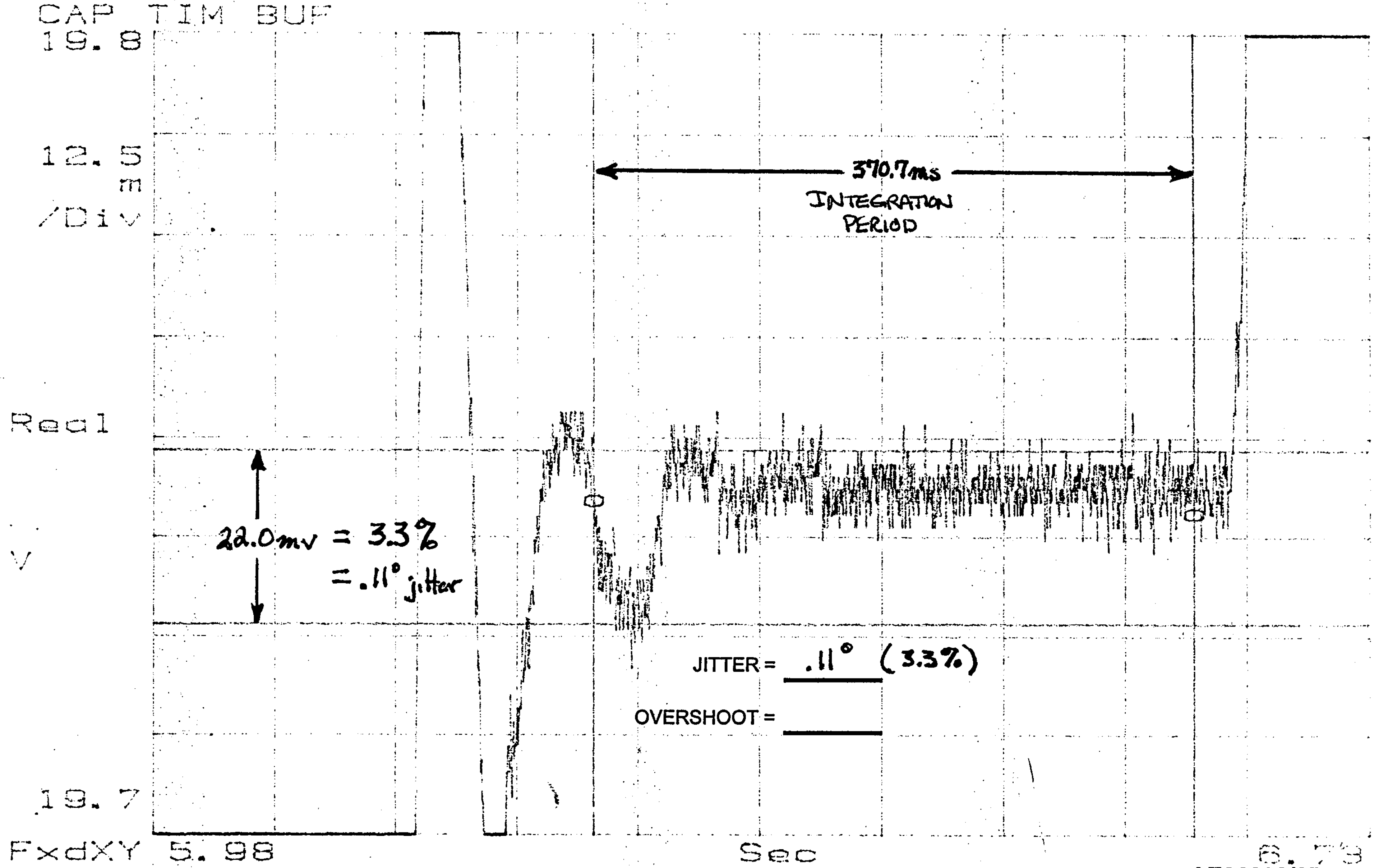
B31

SCEN cold cal.

FILE NAME: 7AP_FS1

X=6.252 S ΔX=370.7mS Y=19.7084 ΔY=22.0mV

Ya=19.7019 ΔYa=1.625mV



JITTER = .11° (3.3%)

OVERSHOOT = ______

AE26002/2D

PARA: 3.4.5.5 Step 38

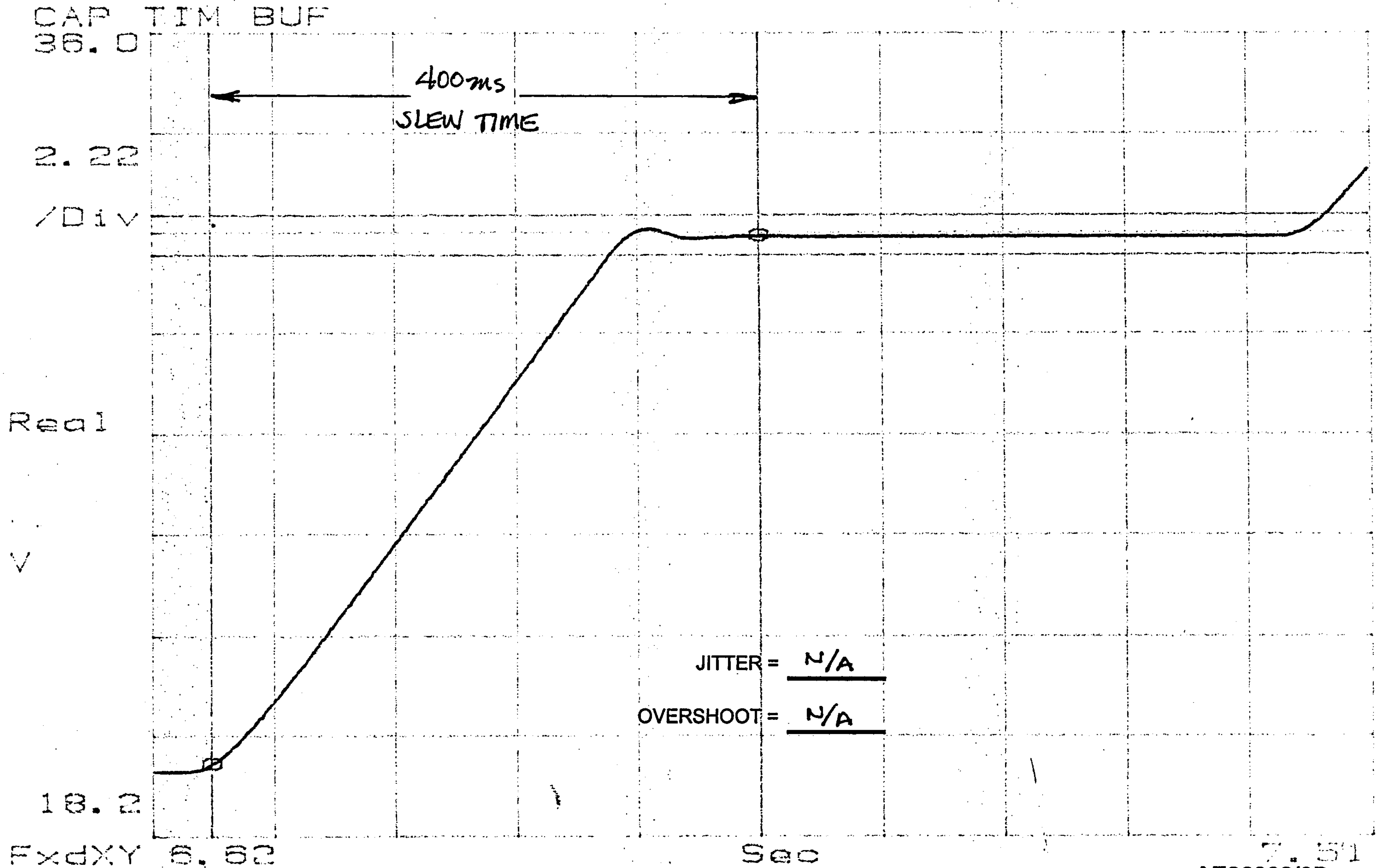
AMSU-A2
s/n 105

7A
268

MAY 28 '98

FILE NAME: 7AP_FS1

X=6.662 S ΔX=400.0mS Y=31.0515 ΔY=882.1mV
Ya=19.8511 ΔYa=11.63 V



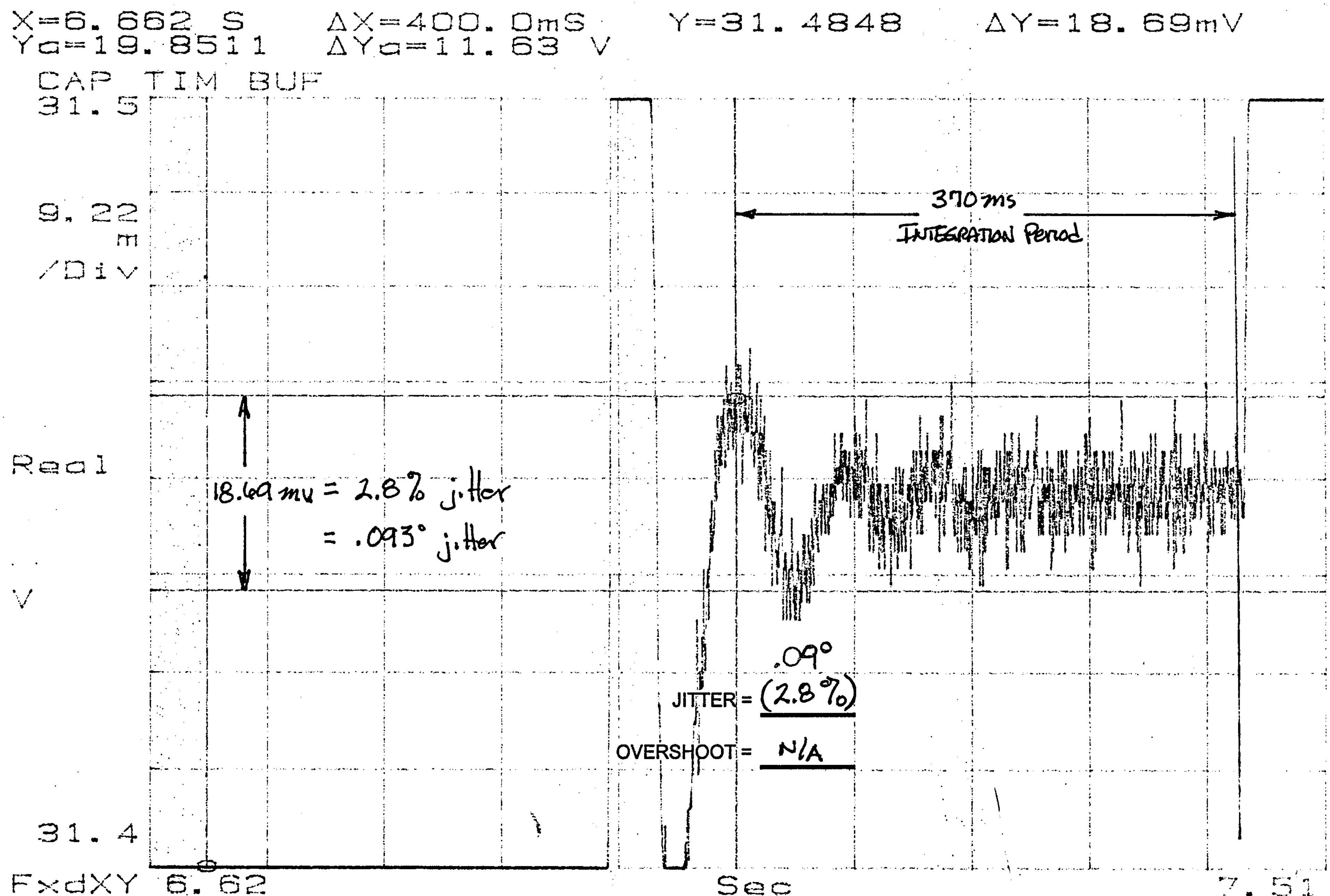
AE26002/2D

PARA: 3.4.5.5 Step 39

AMSU-A2
S/N 105

7A 268

SCEN NADIR LOAD
FILE NAME: 7AP_FS1



AE26002/2D
PARA: 3.4.5.5 Step 39

AMSU A2 S/N 105 7A 268

MAY 28 '98

B54

B35

AE-26002/2C b
16 Dec 97

TEST DATA SHEET 7 (SHEET 1 OF 4)
3.4.~~4~~ 5.5: Scan Motion and Jitter Test

Test Setup Verified: ______ Signature   Shop Order No. 484113

Step No.	Description	Requirement	Test Result	Pass/Fail
7	--	Stepping Slewing <8 sec period per Figure ~~8~~ 8	<8 sec	PASS
9	Scene 1-2 3.33° step	<42 msec rise time per Figure ~~7~~ 9	38.7 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	3.6% j.t. / 1.6% ovr	PASS
10	Scene 2-3 3.33° step	<42 msec rise time per Figure ~~7~~ 9	36.3 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	3.4% j.t / 1.4% ovr	PASS
11	Scene 3-4 3.33° step	<42 msec rise time per Figure ~~7~~ 9	32.8 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	3.4% j.t / 1.7% ovr	PASS
12	Scene 4-5 3.33° step	<42 msec rise time per Figure ~~7~~ 9	38.3 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	2.3% j.t / 2.4% ovr	PASS
13	Scene 5-6 3.33° step	<42 msec rise time per Figure ~~7~~ 9	35.2 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	1.6% j.t / 1.6% ovr	PASS
14	Scene 6-7 3.33° step	<42 msec rise time per Figure ~~7~~ 9	37.5 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	3.1% j.t / 2.8% ovr	PASS
15	Scene 7-8 3.33° step	<42 msec rise time per Figure ~~7~~ 9	35.9 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	3.3% j.t / 1.4% ovr	PASS
16	Scene 8-9 3.33° step	<42 msec rise time per Figure ~~7~~ 9	33.2 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	4.2% j.t / 2.8% ovr	PASS

Figure 7 to 9 change signatures:
TE ______ 5/18/98
QE ~~QE~~ ______
Quality ~~Assurance~~

Pass = P
Fail = F

TA 268

B9 ~~A-9~~ QC 223 5/15/98

B35-2

AE-26002/2~~C~~ D
16 Dec 97

TEST DATA SHEET 7 (SHEET 2 OF 4)
3.4.~~4~~5.5: Scan Motion and Jitter Test

Step No.	Description	Requirement	Test Result	Pass/Fail
17	Scene 9-10 3.33° step	<42 msec rise time per Figure ~~7~~ 9	33.2 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	3.2% jit / .8% ovr	PASS
18	Scene 10-11 3.33° step	<42 msec rise time per Figure ~~7~~ 9	36.3 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	3.3% jit / 1.0% ovr	PASS
19	Scene 11-12 3.33° step	<42 msec rise time per Figure ~~7~~ 9	33.6 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	2.9% jit / 1.8% ovr	PASS
20	Scene 12-13 3.33° step	<42 msec rise time per Figure ~~7~~ 9	32.8 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	3.6% jit / 2.9% ovr	PASS
21	Scene 13-14 3.33° step	<42 msec rise time per Figure ~~7~~ 9	37.9 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	2.5% jit / 2.5% ovr	PASS
22	Scene 14-15 3.33° step	<42 msec rise time per Figure ~~7~~ 9	33.2 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	4.4% jit / 2.3% ovr	PASS
23	Scene 15-16 3.33° step	<42 msec rise time per Figure ~~7~~ 9	37.5 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	3.4% jit / 2.3% ovr	PASS
24	Scene 16-17 3.33° step	<42 msec rise time per Figure ~~7~~ 9	33.2 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	3.3% jit / 2.0% ovr	PASS

Figure 7 to 9 change Signatures:
TE [signature] 5/18/98
~~Quality~~ QE ~~QE~~ [signature]
~~Assurance~~

Pass = P
Fail = F

268 5.19.98

QC 223
5/15/98 [signature]

TEST DATA SHEET 7 (SHEET 3 OF 4)
3.4.~~4~~5.5: Scan Motion and Jitter Test

Step No.	Description	Requirement	Test Result	Pass/Fail
25	Scene 17-18 3.33° step	<42 msec rise time per Figure ~~7~~ 9	33.6 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	4.8% jit / 2.6% ovr	PASS
26	Scene 18-19 3.33° step	<42 msec rise time per Figure ~~7~~ 9	32.4 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	2.6% jit / 1.1% ovr	PASS
27	Scene 19-20 3.33° step	<42 msec rise time per Figure ~~7~~ 9	31.25 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	4.3% jit / 2.3% ovr	PASS
28	Scene 20-21 3.33° step	<42 msec rise time per Figure ~~7~~ 9	35 S	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	3.1% jit / 2.0% ovr	PASS
29	Scene 21-22 3.33° step	<42 msec rise time per Figure ~~7~~ 9	32.8 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	3.5% jit / 3.0% ovr	PASS
30	Scene 22-23 3.33° step	<42 msec rise time per Figure ~~7~~ 9	34 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	2.5% jit / 2.3% ovr	PASS
31	Scene 23-24 3.33° step	<42 msec rise time per Figure ~~7~~ 9	32.4 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	3.1% jit / 1.6% ovr	PASS
32	Scene 24-25 3.33° step	<42 msec rise time per Figure ~~7~~ 9	32.4 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	3.1% jit / 2.4% ovr	PASS

Figure 7 to 9 change Signatures:
TE [signature] 5/18/98
~~QUALITY~~ QE ~~QE~~ ~~ASSURANCE~~ [signature]

Pass = P
Fail = F

QA 289 5.19.98

 QC 223 5/15/98 [signature]

AE-26002/2~~C~~ D
16 Dec 97

TEST DATA SHEET 7 (SHEET 4 OF 4)
3.4.~~4~~ 5.5: Scan Motion and Jitter Test

Step No.	Description	Requirement	Test Result	Pass/Fail
33	Scene 25-26 3.33° step	<42 msec rise time per Figure ~~7~~ 9	33.6 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	4.0% jit / 1.4% ovr	PASS
34	Scene 26-27 3.33° step	<42 msec rise time per Figure ~~7~~ 9	33.6 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	4.0% jit / 3.2% ovr	PASS
35	Scene 27-28 3.33° step	<42 msec rise time per Figure ~~7~~ 9	33.6 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	3.6% jit / 3.2% ovr	PASS
36	Scene 28-29 3.33° step	<42 msec rise time per Figure ~~7~~ 9	37.1 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	4.1% jit / 3.9% ovr	PASS
37	Scene 29-30 3.33° step	<42 msec rise time per Figure ~~7~~ 9	33.2 ms	PASS
		< ±5% jitter per Figure ~~7~~ 9 < +4% overshoot for 19 msec	2.8% jit / 3.5% ovr	PASS
38	Scene 30 Cold Cal 35.0° slew	<0.21 sec slew time per Figure ~~10~~ ~~9~~ 12	< .210 sec	PASS
		< ±0.165° jitter per Figure ~~10~~ ~~9~~ 13	.110° jit	PASS
39	Cold Cal - Warm Cal 96.67° slew	<0.40 sec slew time per Figure ~~11~~ ~~9~~ 14	< .400 sec	PASS
		< ±0.165° jitter per Figure ~~12~~ ~~9~~ 15	.093° jit	PASS

Figure 7, 10, 11, and 12 to 9, (12, 13, 14, & 15) change Signatures:
TE [signature] 5/18/98
~~Quality Assurance~~ ~~QE~~ QE [signature]

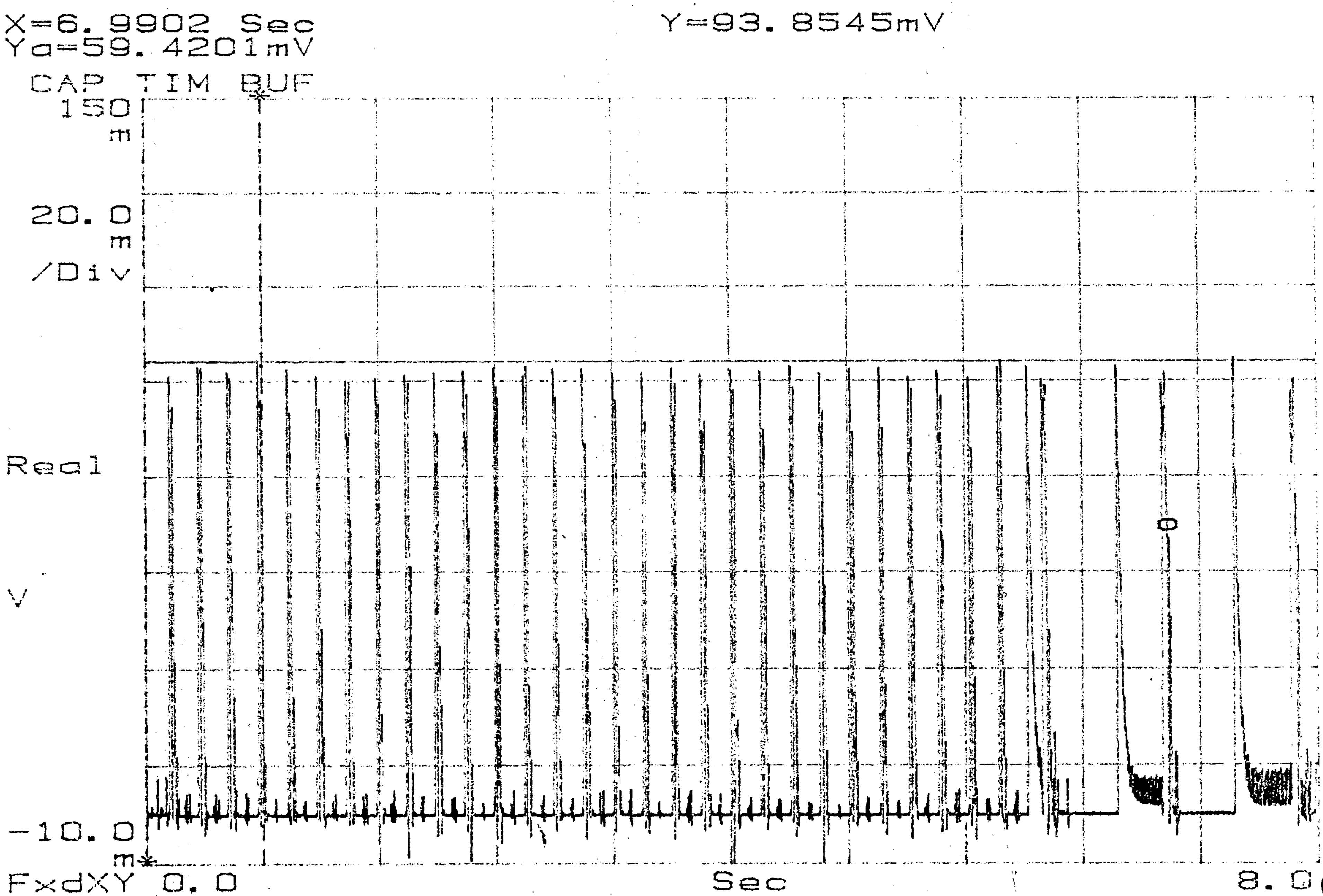
Pass = P
Fail = F

Unit: METSAT AMSU-A2
Serial No.: 105
Date: 5/19/98

Test Engineer: [signature]
Quality Assurance: [signature]
Customer Representative:

QC 223

5/15/98 [signature]



C1

METSAT AMSU-A2 S/N 105
AE26002/2D para 3.4.5.6
Peak Current = 93.85 x $\left(\frac{200ma}{10mv}\right)$ = 1.877A
28V BUS PEAK CURRENT TEST SETUP
File: 6PLB C

MAY 28 '98
TA 892

C 2

AE-26002/2~~C~~ D
16 Dec 97

TEST DATA SHEET 8
3.4.~~4~~.6: Pulse Load Bus Current
5

Test Setup Verified: ____________ Shop Order No. 484113
Signature

3.4.4.6: 28V Bus Peak Current and Rise Time Test

Step No.	Requirement	Test Result	Pass/Fail
4	< 2 A peak any place in the scan	1.877 A	PASS
5	> 70 μsec rise time, 3.33° step	1.1 ms	PASS
6	> 70 μsec rise time, start of WC slew	TH ~~1.2 ms~~ 1.6ms	PASS
6	> 70 μsec rise time, end of WC slew	56 ms	PASS

Pass = P
Fail = F

Unit: MET~~SAT~~ AMSU-A2

Serial No.: 105

Test Engineer: ____________

Quality Assurance: ____________ 5.19.98

Date: 5/19/98

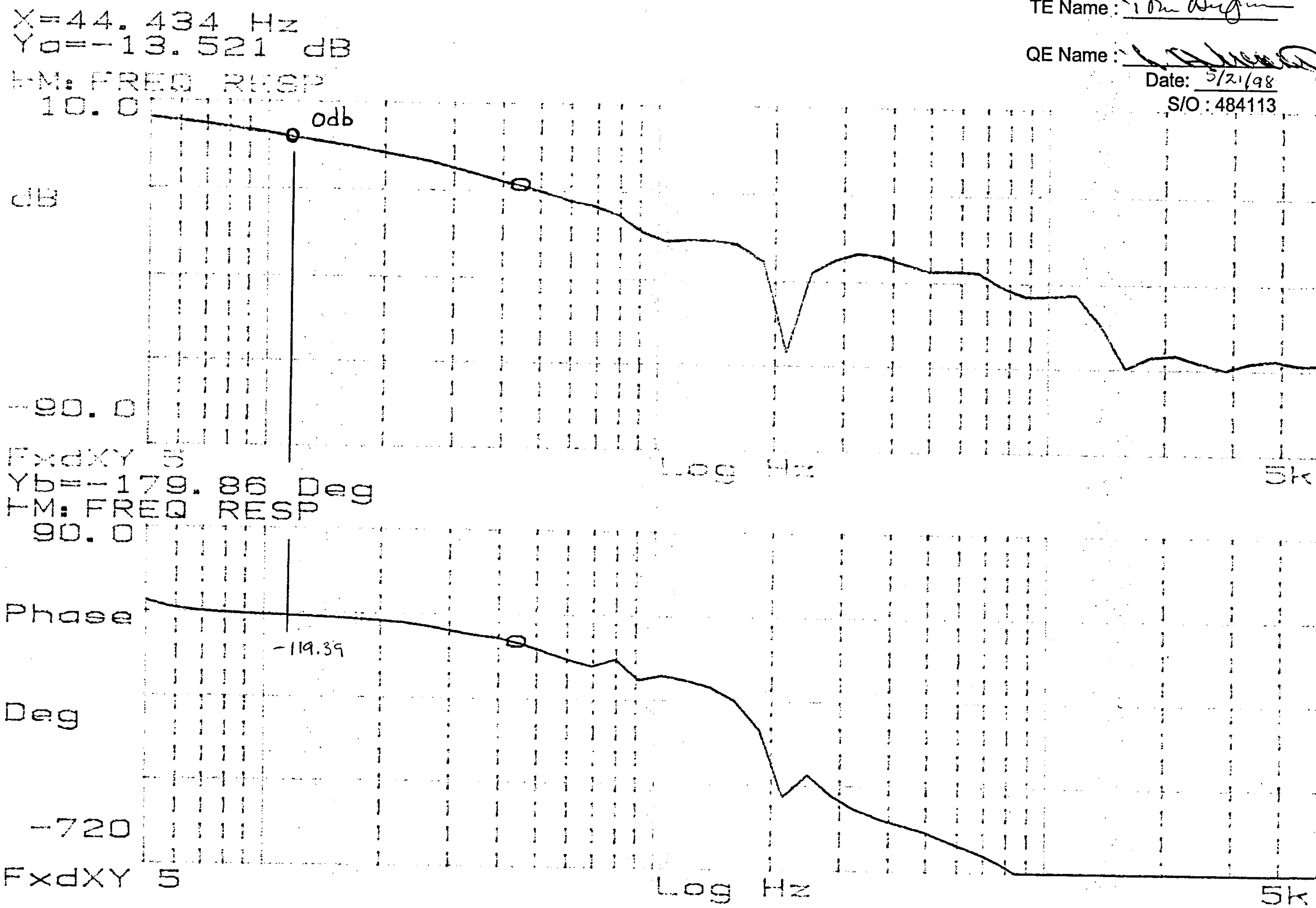
B ~~A~~-13 5/15/98

TE Name : [signature]

QE Name : [signature]

Date: 5/21/98

S/O : 484113



Phase Margin : 179.86 − 119.39 = 60.47°

Gain Margin: −13.5db

file : 11GP_B11

METSAT AMSU-A2 S/N: 105

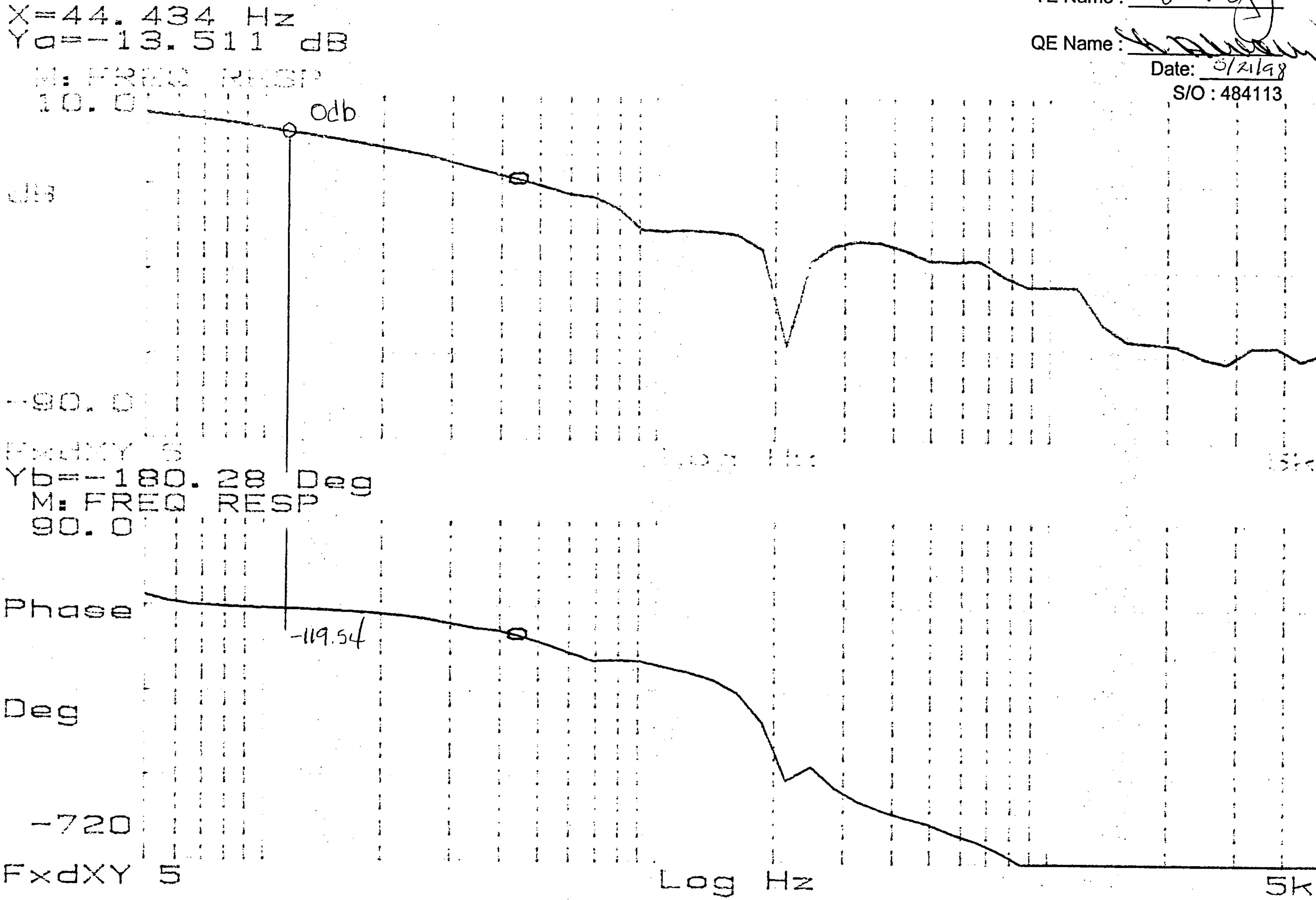
AE 26002/2D para: 3.4.5.8

TE Name :

QE Name :

Date: 5/21/98

S/O : 484113



Phase Margin : 180.28 – 119.54 = 60.74°

Gain Margin: -13.5 db

METSAT AMSU-A2 S/N: 105
AE 26002/2D para: 3.4.5.8

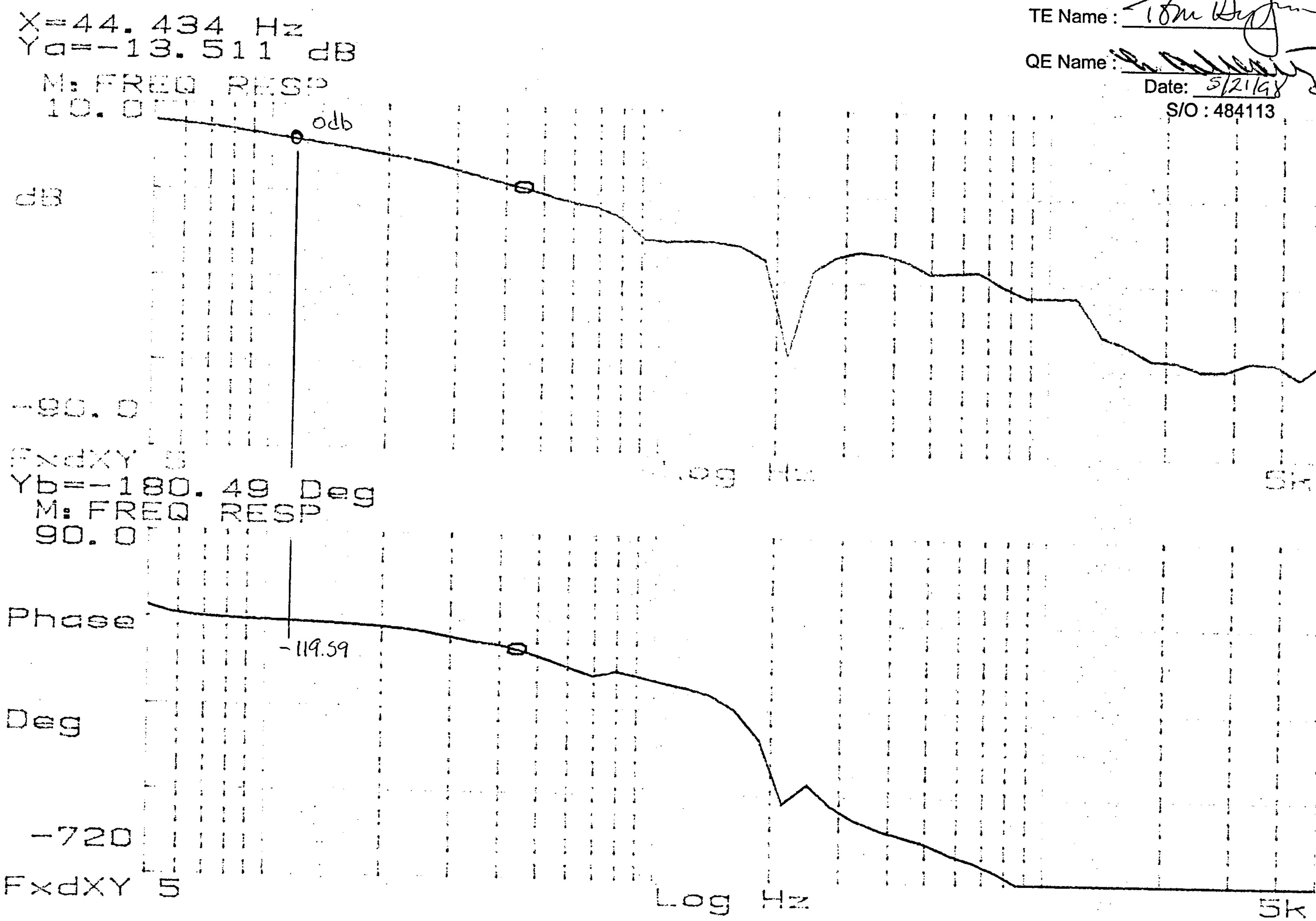
File: 126P 21B

TE Name :

QE Name :

Date: 5/21/98

S/O : 484113



Phase Margin : 180.49 − 119.59 = 60.9°
Gain Margin: −13.5db

file: 12GP_31B

METSAT AMSU-A2 S/N: 105
AE 26002/2D para: 3.4.5.8

D-4

AE-26002/2C
16 Dec 97

TEST DATA SHEET 9
3.4.~~4~~5.8 : Gain/Phase Margin Test

Test Setup Verified: [signature] Signature   Shop Order No. 48413

Temperature: 71.3 °F ~~°C~~

3.4.4.8 Step 12: Gain/Phase Margin Test

Requirement	Test Result		Pass/Fail
12 dB minimum	1	-13.5	PASS
	2	-13.5	
	3	-13.5	
	~~4~~	—	
	~~5~~	—	
25 degrees minimum	1	60.5	PASS
	2	60.7	
	3	60.9	
	~~4~~	—	
	~~5~~	—	

Pass = P
Fail = F

Unit: METSAT AM~~SU~~-A2 TH

Serial No.: 105

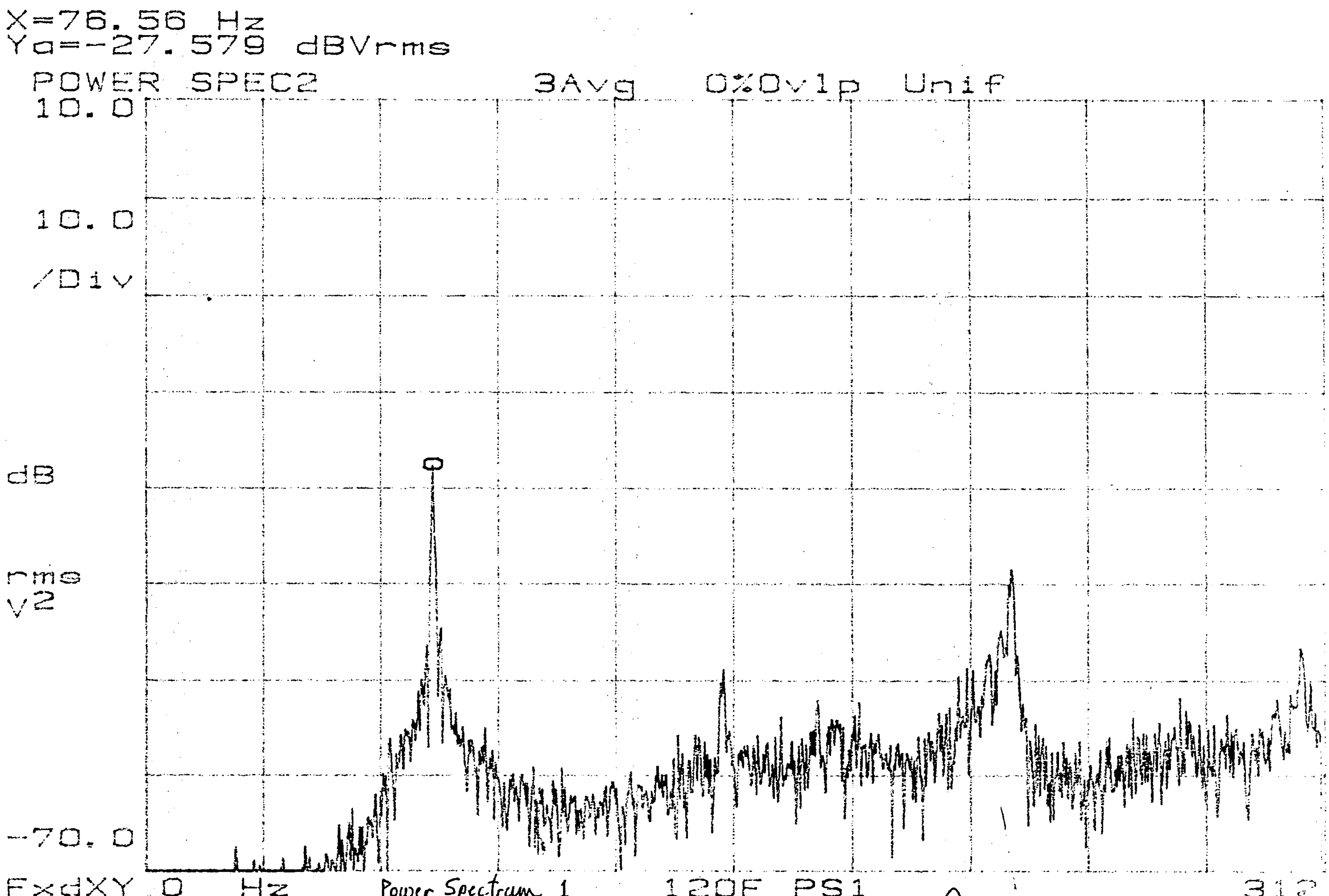
Date: 5/21/98

Test Engineer: [signature]

Quality Assurance: QA 268 MAY 28 '98

Customer Representative:

B~~A~~-14 [signature] 5/15/98



Power Spectrum 1

S/O : 484113

SN: 105

P/N : 1331200-2-1T

A2 3.~~4~~5.9. Gain Margin = 8.984 dB

Rpot = 36.63 KΩ

R58 = ~~38.58KΩ~~

R58 = 18.2 KΩ

Test Eng :

Date : 5-26-98

Quality : 7A 288 MAY 28 '98

E 2

AE-26002/2C

16 Dec 97

TEST DATA SHEET 10

3.4.~~4~~5.9: Operational Gain Margin Test

Test Setup Verified: [signature] Signature

Shop Order No. 484113

Temperature: 71.2 °F ~~°C~~

3.4.4.9: Operation Gain Margin Test

Step No.	Requirement		Test Result	Pass/Fail
11	R58 Resistance (Kohms)			
	Test Pot Resistance (Kohms)	1	38.58 KΩ	P
		2	41.2 KΩ	P
		3	42.88 KΩ	P
12	Oscillation Frequency (Hz)	1	227.73 Hz	P
		2	228.52 Hz	P
		3	228.52 Hz	P
16	Gain Margin, 9 dB minimum	1	9.277 dB	P
		2	9.6563 dB	P
		3	9.8908 dB	P

Pass = P
Fail = F

Unit: METSAT AMSU-A2

Serial No.: 105

Test Engineer: [signature]

Quality Assurance: QA 269 MAY 29 '98

Date: 5-26-98

[signature] 5/15/98

NASA
National Aeronautics and Space Administration

Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
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4. Title and Subtitle Integrated Advanced Microwave Sounding Unit-A (AMSU-A), Performance Verification Report	5. Report Date July 1998 6. Performing Organization Code ---
7. Author(s) A. Nieto	8. Performing Organization Report No. 11190 10. Work Unit No. ---
9. Performing Organization Name and Address Aerojet 1100 W. Hollyvale Azusa, CA 91702	11. Contract or Grant No. NAS 5-32314
12. Sponsoring Agency Name and Address NASA Goddard Space Flight Center Greenbelt, Maryland 20771	13. Type of Report and Period Covered Final 14. Sponsoring Agency Code ---

15. Supplementary Notes

---

16. ABSTRACT (*Maximum 200 words*)

This is the Performance Verification Report, METSAT AMSU-A2 Antenna Drive Subassy, P/N 1331200-2, S/N 105 for the Integrated Advanced Microwave Sounding Unit-A (AMSU-A).

17. Key Words (Suggested by Author(s))	18. Distribution Statement
EOS Microwave System	Unclassified --- Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of pages	22. Price
Unclassified	Unclassified		---

NASA FORM 1626 OCT 86

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6. AUTHOR(S) A. Nieto	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Aerojet 1100 W. Hollyvale Azusa, CA 91702	8. PERFORMING ORGANIZATION REPORT NUMBER 11190 July 1998
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) NASA Goddard Space Flight Center Greenbelt, Maryland 20771	10. SPONSORING/MONITORING AGENCY REPORT NUMBER ---
11. SUPPLEMENTARY NOTES ---	
12a. DISTRIBUTION/AVAILABILITY STATEMENT ---	12b. DISTRIBUTION CODE ---

13. ABSTRACT (*Maximum 200 words*)

This is the Performance Verification Report, METSAT AMSU-A2 Antenna Assy, P/N 1331200-2, S/N 105 for the Integrated Advanced Microwave Sounding Unit-A (AMSU-A).

14. SUBJECT TERMS EOS Microwave System	15. NUMBER OF PAGES
	16. PRICE CODE ---

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Unclassified	Unclassified	Unclassified	SAR

NSN 7540-01-280-5500

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Prescried by ANSI Std 239-18
298-102

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Performance Verification Report Subassembly and Complete Instrument Assembly, METSAT AMSU-A2 Antenna Drive Subassembly, P/N 1331200-2, S/N 105	Report 11190 July 1998

INPUT FROM:	DATE	CDRL:	SPECIFICATION ENGINEER:	DATE
T. Higgins		208		

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APPROVED SIGNATURES	DEPT. NO.	DATE
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By my signature, I certify the above document has been reviewed by me and concurs with the technical requirements related to my area of responsibility.

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